2

Longmans' Junior Mathematics

N V Brindley

Longmans' Junior Mathematics

Stage 2

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London Colney County Primary School
St Albans

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1 Magic Squares

8	1	6
3	5	7
4	9	2

Copy this square. Add the numbers in each line across. Add the numbers in each line down. Add the numbers from corner to corner. Write down your answers. What do you notice about them? This is called a **magic square,** because people once thought that only magic could work like this. (The meanings of words printed like **magic square** are on pages 90 to 95.) But we know that there is no magic in mathematics. There is a reason for everything.

PRACTICE 1 Fill in the missing numbers in these squares.

1)

7		5
6		
11		

2)

5		
10	6	
		7

3)

10	11	6
12		

4)

		18
	12	
6	16	

5)

		48
	30	
12		24

6)

		1s 4d
		2d
	1s 2d	1s

7)

	1s 2d	
	10d	
	6d	11d

8)

2s	1s 11d	2s 4d
	2s 1d	

9)

	6 ins	
2 ins	10 ins	1 ft 6 ins

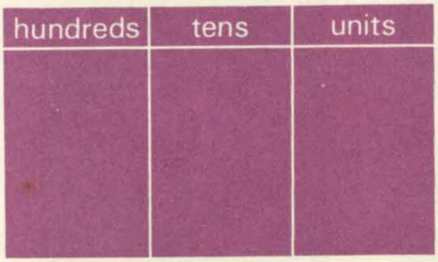
10)

1 ft 6 ins	4 ins	1 ft 2 ins
	1 ft 8 ins	

2

Writing Numbers

Make an **abacus** like this in your book, or on a piece of card.

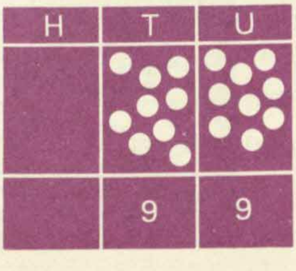


In the units column, put the biggest number of counters you can have. How many is this? Now put one more counter in the units column. How many counters have you now? What must you do now?

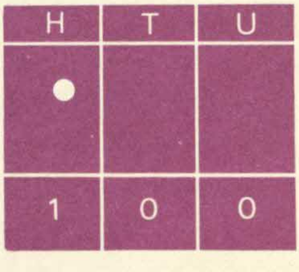
Put 9 counters in the tens column. This is the largest number of counters you may leave in this column. What number is it? Make the largest number you can, using tens and units. What is this number?

Add another counter to the units column. How many are there now? What must you do? Now how many counters are there in the tens column? Try to think what you must do next.

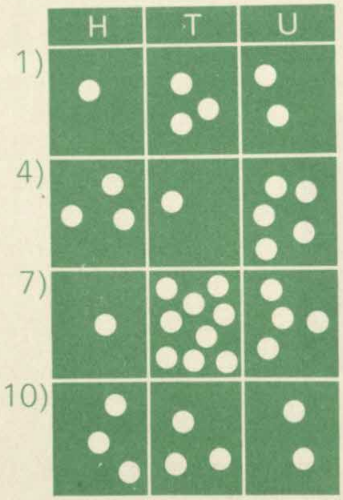
You must not leave more than 9 counters in the tens column. If there are ten, you must take them off and put one counter in the next column. This is the *hundreds* column. Ten tens make a hundred.

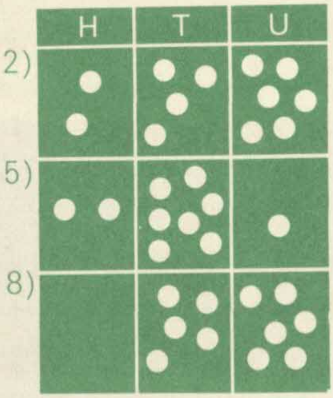


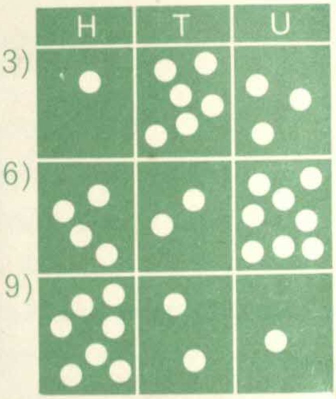
Add one more counter,
and you have



PRACTICE 2 Write these numbers in figures





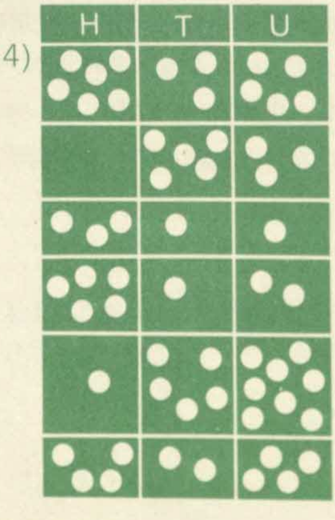


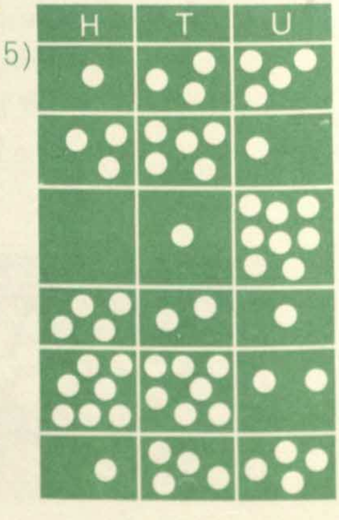
PRACTICE 3 Make these numbers on your abacus, and copy them into your book.

1) 256 2) 461 3) 714 4) 523
5) 385 6) 632 7) 47 8) 269
9) 824 10) 436

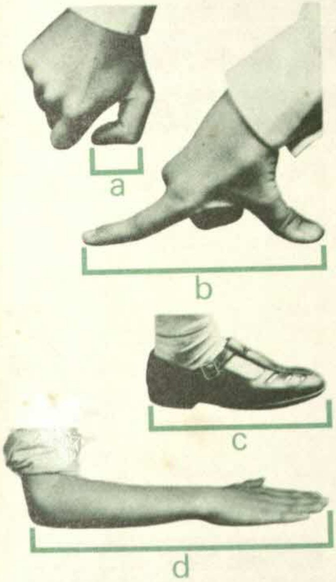
PRACTICE 4 Write these numbers in order of size, starting with the smallest. Write all the numbers in figures.

1) 248, 76, 350, 190, 23, 9
2) 632, 165, 87, 211, 4, 524
3) 473, 673, 453, 476, 553, 511





3 Using Yourself as a Measure



Measure and write down the length of

a) the end joint of your thumb;
b) your span;
c) your shoe;
d) your cubit.

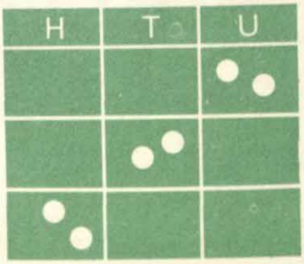
Use these measurements to find

1) the length of an exercise book in inches;
2) the width of an exercise book in inches;
3) the height of a door in feet and inches;
4) the width of a room in feet and inches.

Check your measurements with a ruler or tape-measure. How far out were you in your first measurements?

4 Zero

The figures we use when we write our numbers were invented by the Hindus in India. We call them Arabic figures, because we learnt them from the Arabs. For hundreds of years, only nine figures were used. This made it difficult to do sums.

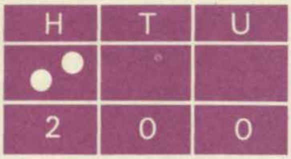


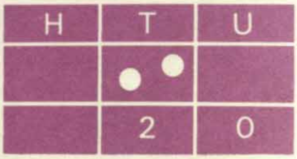
Make these numbers on your abacus.

We know that the first number is two, the second number is twenty, and the third number is two hundred. But if we just write 2, we do not know if it means 2 units, 2 tens or 2 hundreds.

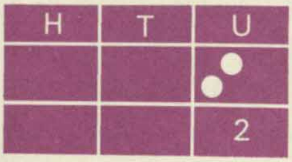
At last, the Hindus invented a way of showing which number is meant. They put a **zero** in the empty units or tens spaces. The Hindu word for zero is *sunya*, which means *empty*. Sometimes we call it *nought*, which means *nothing*.

The zero keeps the figures in their places.

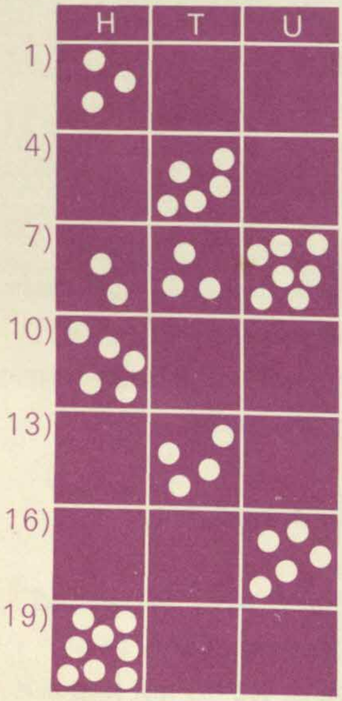


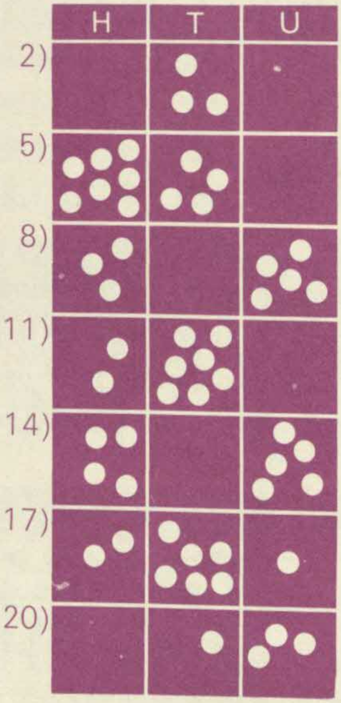


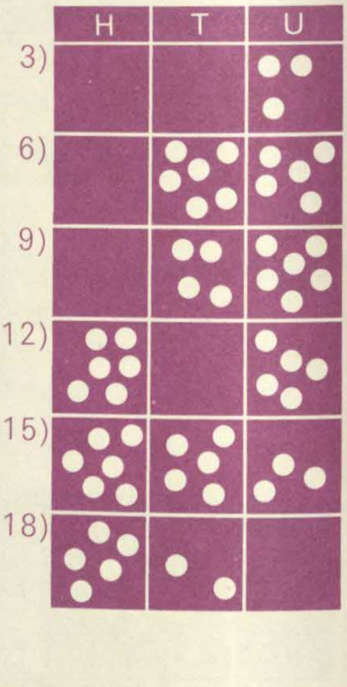
We do not need a zero to keep the units in their places. They always stay there.



PRACTICE 5 Write these numbers in figures.



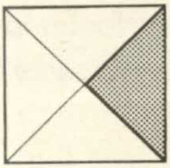




PRACTICE 6 Make these numbers on your abacus, and copy each one into your book.

1) 53 2) 530 3) 503 4) 27
5) 340 6) 60 7) 400 8) 8
9) 206 10) 700

5 Fractions



This square is divided into 4 equal parts. Each part is one square divided by four, which we write $\frac{1}{4}$, or one quarter.

PRACTICE 7 What **fraction** is the shaded part of each diagram?

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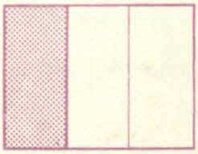

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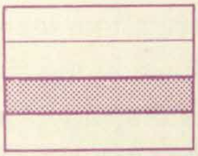

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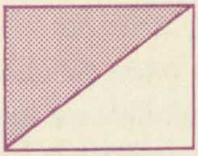

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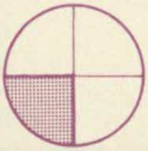

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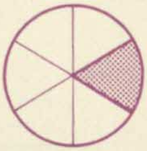

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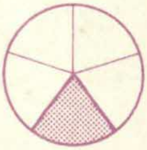

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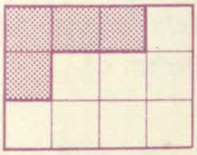

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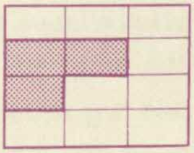

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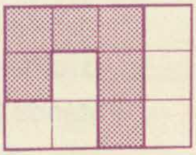

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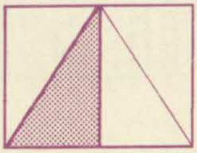
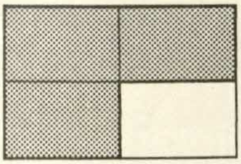
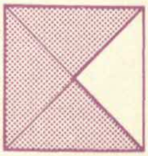




This rectangle is divided into four parts, so that each part is $\frac{1}{4}$. Three of the parts are three quarters, which we write $\frac{3}{4}$.

PRACTICE 8 What fraction is the shaded part of each diagram?

1)



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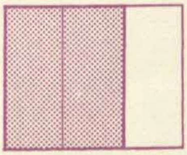

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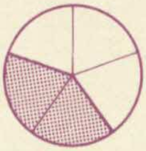

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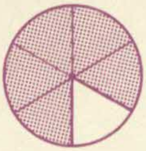

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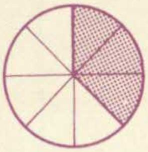

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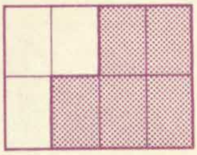

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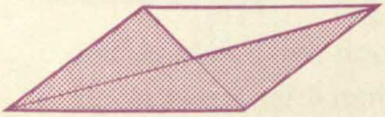

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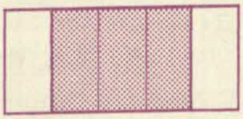

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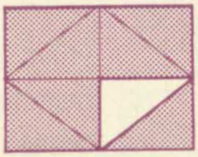

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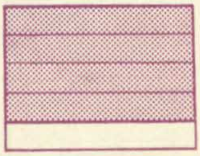
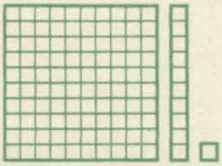


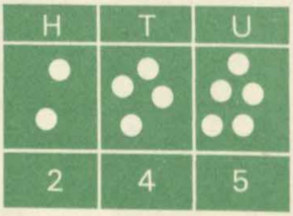
6 How Big?

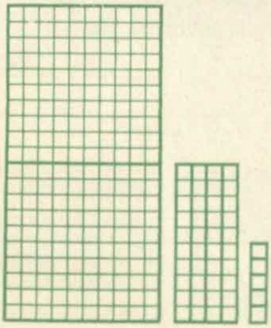


Although we use the same figures for hundreds, tens and units, they do not mean the same thing. Let us see what they do mean.
On squared paper, draw these shapes (but make them bigger than they are here), and cut them out. You will want nine of each shape.

Let us call the small square one unit, or 1. How many small squares (units) are there in each strip? How many strips are there in the large square? How many units are there in the large square?
Each counter in the units column of your abacus stands for one unit. Each counter in the tens column of your abacus stands for one strip. Each counter in the hundreds column of your abacus stands for one big square.
Why do we use the counters instead of squares and strips?

The number 245 looks like this on your abacus.





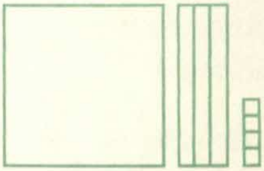
It should really look like this.

Now you can see that, though there are only two hundreds, they are bigger than 4 tens, and much bigger than 5 units.

PRACTICE 9 Make each of these numbers on your abacus, then make it with your squares and strips.

1)	347	2)	491	3)	256	4)	427
5)	370	6)	200	7)	20	8)	2
9)	119	10)	199				

PRACTICE 10 Write these numbers in figures.

1)


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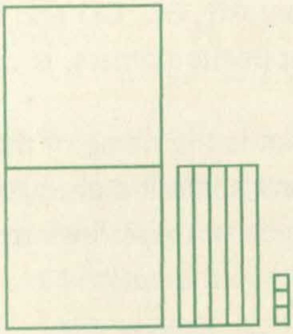

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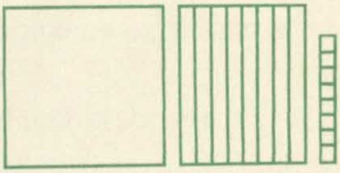

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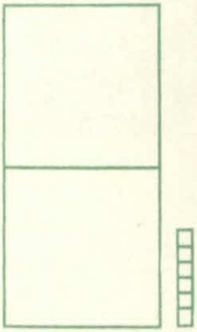

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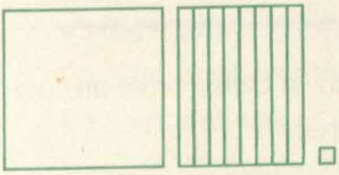

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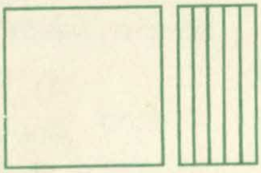

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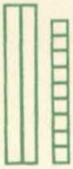

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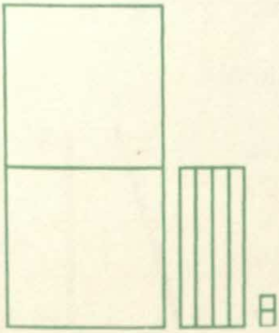

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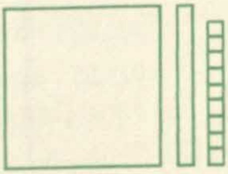

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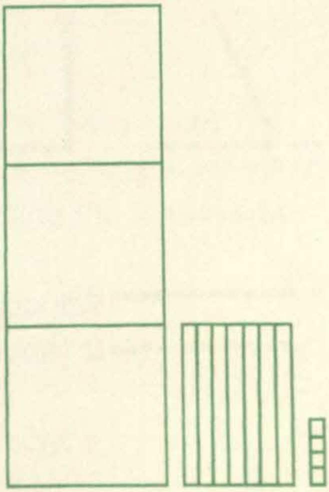
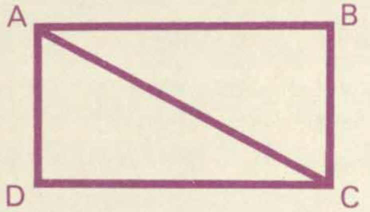


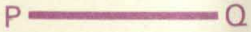
7 Naming Lines



When we want to name a **line,** we do it by putting a capital letter at each end. In this rectangle, the sides are AB, BC, CD and DA. The line AC, which joins opposite corners, is called a diagonal.

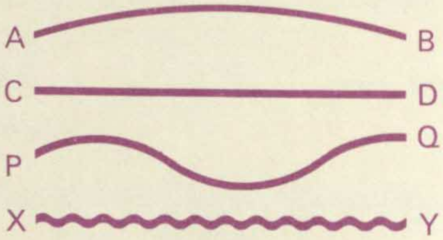
PRACTICE 11

1) What is the name of this line?

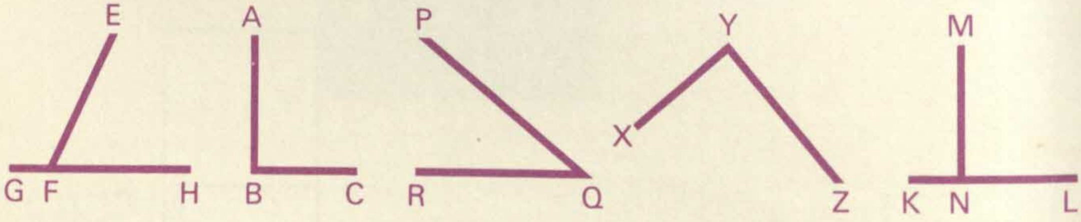


2) Draw a line 2 inches long, and name it XY.

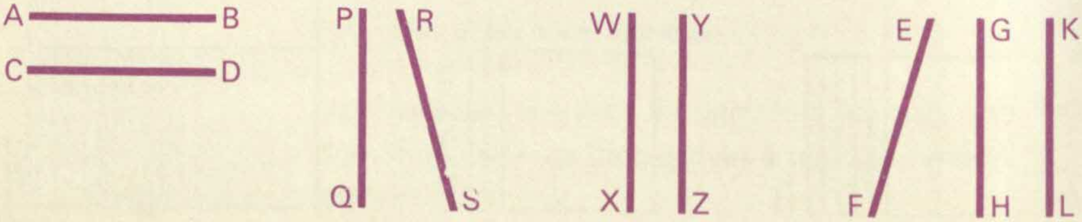
3) Which of these lines is the shortest?
How do you know?



4) Which of these lines are perpendicular to one another?



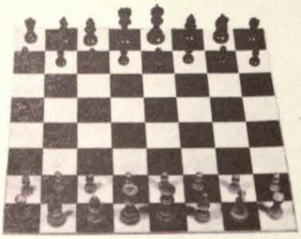
5) Which of these lines are parallel?



8 Shopping

Large jigsaw	5s	3d	Doll	6s	4d
Compendium	4s	7½d	Small jigsaw	3s	6½d
Paint box	2s	10d	Chessmen	7s	3½d
Aeroplane	6s	11½d	"Engineero"	5s	9d
Draughts	3s	2d	Boat	4s	8d
"Ludo"	1s	9½d	Chessboard	2s	1d
Car	2s	7d	Garage	7s	6d
Minilorry	1s	5d	Minicar	1s	1½d

PRACTICE 12 Make out bills for these, and give change from a pound note.



1) Chessmen, draughts and a chessboard
2) Large jigsaw, doll, garage
3) Garage, minilorry, minicar
4) Compendium, doll, small jigsaw
5) "Engineero", paint box, "Ludo"
6) Small jigsaw, large jigsaw, paint box
7) Compendium, small jigsaw, minicar
8) Car, boat, aeroplane
9) "Engineero", 2 minilorries, boat
10) 2 small jigsaws, 2 boats, 3 minicars

PRACTICE 13 You have 1 half-crown, 3 florins, 2 sixpences, 5 pennies and 2 halfpennies. How much have you? Pay for these things exactly, using the fewest coins you can.

1) Boat
2) Draughts
3) Small jigsaw
4) Garage
5) Large jigsaw
6) Doll
7) "Engineero"
8) Aeroplane
9) Chessmen
10) "Ludo"

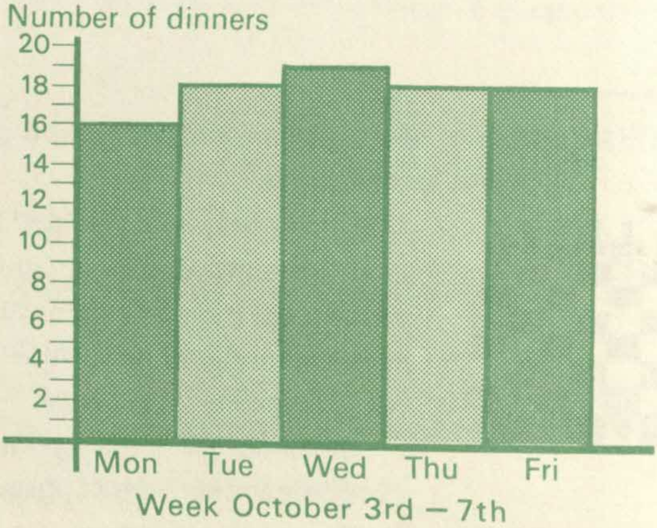
9

Histograms

Find out how many children in your class stayed to dinner each day last week. Make a table like this:

DAY	Monday	Tuesday	Wednesday	Thursday	Friday
NUMBER OF DINNERS	16	18	19	18	18

Make a frame, and draw a block **graph** like this.



Another name for a block graph is **histogram.** We chose to count the numbers each day. On which axis do we put the days? Why? We found out the numbers staying to dinner. On which axis do we put the numbers of dinners? Why?

Collect some other sets of numbers, such as team points, or savings, and draw block graphs for them.

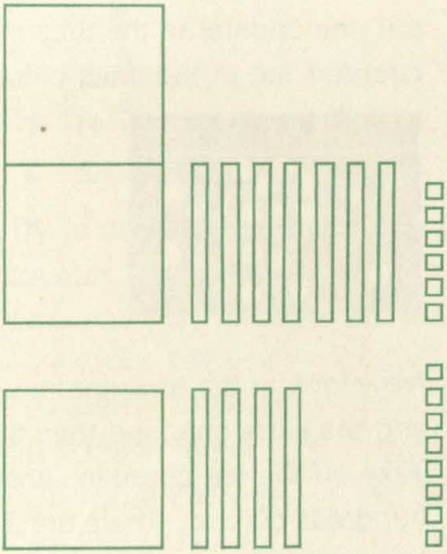
10

Addition

Addition is putting all the units, all the tens and all the hundreds together, and working out how many there are.

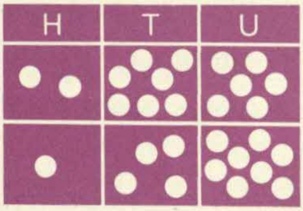
When we add, do we have more things than we started with, or do we have the same number, or do we have fewer things than we started with?
Addition is re-arranging the things so that we can write them as one number instead of as a lot of numbers.

Make the numbers 276 and 148, using strips and squares.

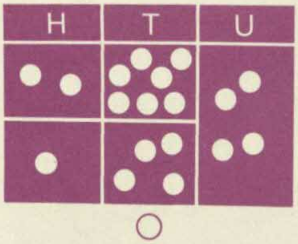


Take the 8 small squares from the bottom number, and 2 from the small squares at the top. Now you have enough to make a strip. Take them off, and put a strip instead.
There are 4 small squares left.
Now look at the strips. Take the 4 strips from the bottom, and the extra one you have just put there, and then 5 strips from the top.
You have enough strips now to make a big square. Take them off, and put a big square instead. There are 2 strips left. Now you have 4 big squares.
Write down the number you have now.

Make the numbers 276 and 148 on your abacus.

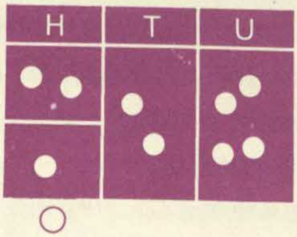


Now we shall add them, exactly as we did with squares and strips. Look at the units column. Take the 8 counters from the bottom number, and 2 from the top. Take off the ten unit counters, and instead put one counter in the tens column. There are four counters left in the units column.



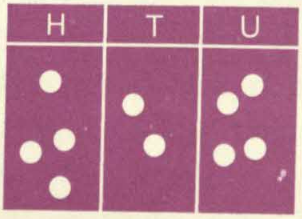
$$\begin{array}{ccc} H & T & U \\ 2 & 7 & 6 \\ 1 & 4 & 8 \\ & {\scriptstyle 1} & \\ \hline & & 4 \\ \hline \end{array}$$

Now look at the tens column. Take the 4 counters, and the extra one, and then 5 from the top. Take off the ten counters, and put one in the hundreds column. There are 2 counters left in the tens column.



$$\begin{array}{ccc} H & T & U \\ 2 & 7 & 6 \\ 1 & 4 & 8 \\ {\scriptstyle 1} & {\scriptstyle 1} & \\ \hline & 2 & 4 \\ \hline \end{array}$$

There are 4 counters in the hundreds column.



$$\begin{array}{ccc} H & T & U \\ 2 & 7 & 6 \\ 1 & 4 & 8 \\ {\scriptstyle 1} & {\scriptstyle 1} & \\ \hline 4 & 2 & 4 \\ \hline \end{array}$$

When we wrote the sum using figures, we put the extra ones above the answer.
Sometimes, we put them underneath the answer.

$$\begin{array}{ccc} 2 & 7 & 6 \\ 1 & 4 & 8 \\ \hline 4 & 2 & 4 \\ \hline {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$$

Sometimes, we can remember them without writing them down at all.

$$\begin{array}{ccc} 2 & 7 & 6 \\ 1 & 4 & 8 \\ \hline 4 & 2 & 4 \\ \hline \end{array}$$

PRACTICE 14 Try to do these without using your abacus, or your squares and strips. If you are not sure how to do a sum, you may use your abacus.

1) $265 + 158 = x$
2) $374 + 287 = y$
3) $498 + 143 = z$
4) $567 + 375 = a$
5) $389 + 63 = b$
6) $278 + 594 = c$
7) $56 + 287 = p$
8) $382 + 546 = q$
9) $259 + 346 = x$
10) $394 + 186 = y$
11) $137 + 248 = z$
12) $456 + 376 = a$
13) $205 + 296 = b$
14) $731 + 169 = c$
15) $648 + 178 = p$
16) $235 + 143 + 256 = q$
17) $129 + 253 + 165 = r$
18) $342 + 128 + 234 = x$
19) $238 + 104 + 53 = y$
20) $412 + 249 + 170 = z$

PRACTICE 15 Write an **equation** for each of these stories and solve it. Then turn the answer back into words.

1) In our school there are 169 boys and 184 girls. How many children are there in the school?

2) In the Test Match, England scored 276 in the first innings and 178 in the second innings. What was England's total score?

3) Our school library has 159 fiction books and 157 non-fiction. How many books are there altogether?

4) Father travelled 229 miles in his car to visit his friend. He came back by a shorter way, which was 198 miles. How far did he travel altogether?

5) At a cinema, 467 tickets were sold to grown-ups and 368 to children. How many seats were taken?

6) Joan had filled one stamp-album with 785 stamps. In her second album, she had 137 stamps. How many stamps did she have altogether?

7) There were 75 first class passengers on the train, and 268 second class. How many passengers were on the train?

8) Our Town Exhibition was open for 3 days. On Thursday, 247 people attended; on Friday there were 186; and on Saturday 469 came. How many people visited the exhibition?

9) Three lorries brought boxes into the yard. The first carried 288 boxes, the second 250 and the third 288. How many boxes did they deliver altogether?

10) In a school, there were 117 boys and 109 girls in the juniors, and 78 boys and 64 girls in the infants. How many children were there in the school?

PRACTICE 16 Write a sensible story about each of these sums.

1) $235+186=421$

2) $209+364=573$

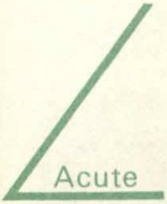
3) $172+98=270$

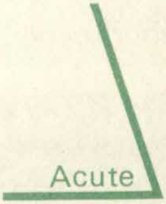
4) $329+67+158=554$

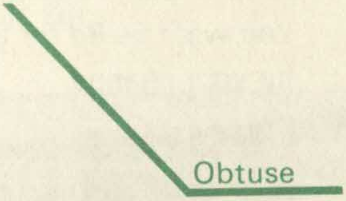
5) $244+152+137=533$

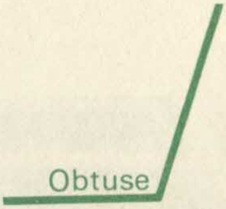
11 My Book of Angles

We know what a right-angle is. Not all angles are right-angles. Some are smaller than a right-angle; these are **acute angles.** "Acute" means "sharp" Some are bigger than a right-angle; these are **obtuse angles.** "Obtuse" means "blunt". A right-angle is not acute and it is not obtuse.

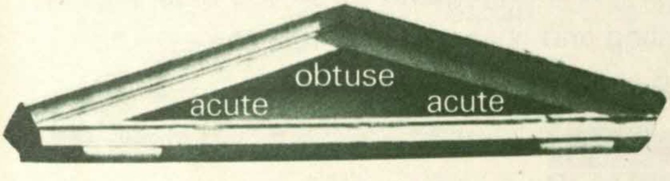


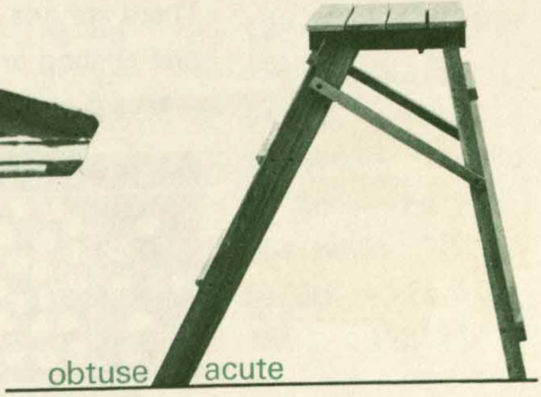




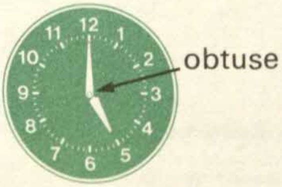


Make "My Book of Angles". Find as many acute and obtuse angles as you can, in and out of school. Here are some that you might find.





PRACTICE 17 The hands of a clock make an angle with each other. At 5 o'clock, they make an obtuse angle. Is the angle acute, obtuse, or a right-angle at these times?

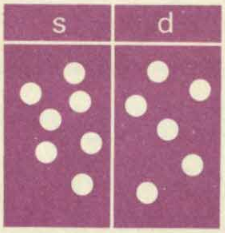


1) 2 o'clock
2) 11 o'clock
3) 7 o'clock
4) 3 o'clock
5) 8 o'clock
6) 9 o'clock
7) 10 o'clock
8) 2.15
9) 9.35
10) 4.45

12 Subtracting Shillings and Pence

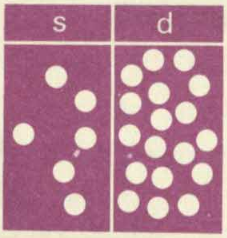
We know how the shopkeeper gives change by adding on. Sometimes it is easier to find the change by **subtraction.** Supposing we gave three half-crowns for a book costing 5s 8d. We must do the sum, 7s 6d − 5s 8d.

On your abacus, make the 7s 6d we gave the shopkeeper. You have to split this into two parts. You want 5s 8d for the shopkeeper, and the rest for your change.



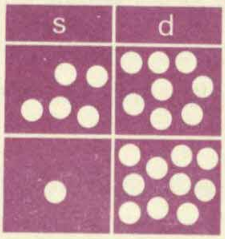
$$\begin{array}{cc} \text{s} & \text{d} \\ 7 & 6 \\ 5 & 8 \\ \hline \end{array}$$

There are not enough pennies, so you must take off one shilling and change it into 12 pennies. This makes 6 shillings and 18 pennies.



$$\begin{array}{cc} \text{s} & \text{d} \\ \cancel{7}^{6} & \cancel{6}^{18} \\ 5 & 8 \\ \hline \end{array}$$

You can split the 18 pennies into 8 and 10, and the 6 shillings into 5 and 1.



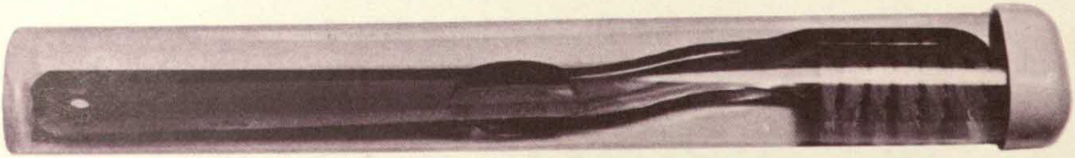
$$\begin{array}{cc} \text{s} & \text{d} \\ \cancel{7}^{6} & \cancel{6}^{18} \\ 5 & 8 \\ \hline 1 & 10 \end{array}$$

You should have 1s 10d change. Write the sum in your book.

7777

PRACTICE 18 Find the change for each of these by subtraction, using your abacus.

1) Give 6s 6d for a toy costing 4s 10d.
2) Give 8s 6d for a jug costing 6s 11d.
3) Give 5s for a cake costing 2s 9d.
4) Give 3 half-crowns and a florin for a cushion costing 8s 10d.
5) Give a ten-shilling note for a toothbrush costing 3s 8d.



PRACTICE 19 Do these by subtraction.

1) 18s 4d − 8s 7d
2) 12s 1d − 6s 11d
3) 16s 5d − 5s 4d
4) 13s 8d − 8s 10d
5) 17s 6d − 9s 7d
6) 17s − 14s 5d
7) 15s 2d − 7s 8d
8) 9s 9d − 4s 6d
9) 14s − 6s 9d
10) 14s 1d − 11s 8d
11) 18s 2d − 13s 6d
12) 8s 3d − 5s 10d
13) 19s 7d − 15s 5d
14) 12s 8d − 10s 3d
15) 15s 7d − 10s 9d
16) 9s 3d − 7s 11d
17) 16s 2d − 12s 3d
18) 15s − 12s 11d
19) 11s 6d − 4s 10d
20) 10s 9d − 9s 11d

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PRACTICE 20 Find the change for these in whichever way you think is easiest.

1) Give 12s 6d for a basket costing 10s 7d.
2) Give 10s 6d for a towel costing 9s 4d.
3) Give 15s for a record costing 11s 3d.
4) Give a ten-shilling note for a postal order costing 4s 2d.
5) Give a ten-shilling note for a torch costing 5s 7d.

PRACTICE 21 Remember that subtraction is splitting a number into two parts, while addition is putting the two parts together again.

19s 3d − 13s 7d = 5s 8d
19s 3d − 5s 8d = 13s 7d
13s 7d + 5s 8d = 19s 3d

Make two other equations from each of these.

1) 12s 5d + 4s 9d = 17s 2d
2) 9s 6d + 6s 10d = 16s 4d
3) 14s 3d − 8s 11d = 5s 4d
4) 18s − 7s 6d = 10s 6d
5) 7s 8d + 4s 4d = 12s

PRACTICE 22 Write these questions in numbers, and find the answers in the way you find easiest. Do not forget to turn your answer back into words.

1) For her birthday, Sally had 6s 6d from her uncle and 8s 9d from her aunt. How much did she have from them both?

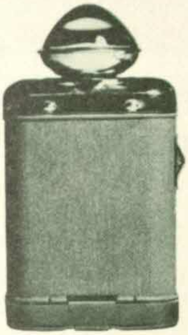
2) Jean and Gerald were buying between them a book costing 8s 6d. Gerald had 4s 7d. How much did Jean have to give?

3) Barry and Sandra helped Mother in the garden. Barry had 2s 6d and Sandra had 1s 9d. How much did Mother pay them?

4) Tom is saving to buy a model aeroplane for 18s 6d. He has saved 11s 10d. How much more does he need?

5) Mother bought a pair of stockings for 5s 8d. The shopkeeper gave Mother 1s 10d change. How much had Mother given her?

6) Helen saved 4s 7d in the first week, 3s 10d in the second week and 5s 8d in the third week. How much did she save in the three weeks?



7) At a sale, a tie marked 6s 3d was sold for 3s 11d. How much was it reduced?

8) Mother had in her purse 3 half-crowns, 2 florins, 3 sixpences, 7 threepenny bits and 8 pennies. How much did she have?

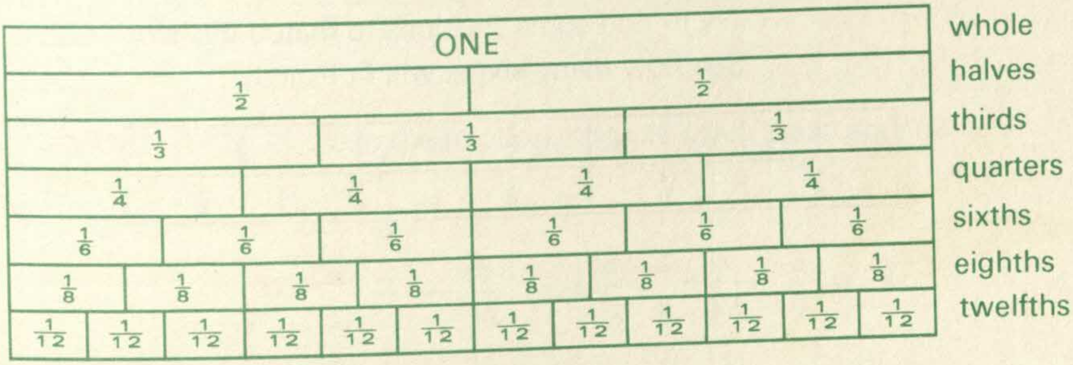
9) Bobby gave the shopkeeper 3 florins. The shopkeeper gave Bobby a torch and 1s 7d change. How much did the torch cost?

10) Terry had a ten-shilling note. He wanted to buy a garage for 7s 6d, a minicar for 1s 5d and a minilorry for 1s 3d. Could he buy them all?

PRACTICE 23 Tell a sensible story about each of these sums.

1) 6s 3d − 3s 8d = 2s 7d
2) 9s 11d + 4s 5d = 14s 4d
3) 7s 6d − 6s 11d = 7d
4) 10s − 3s 6d = 6s 6d
5) 1s 7d + 2s 10d + 4s 11d = 9s 4d

13 Using the Fraction Strips


ONE
whole
$\frac{1}{2}$ $\frac{1}{2}$
halves
$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$
thirds
$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$
quarters
$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$
sixths
$\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$
eighths
$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
twelfths

Use the set of fraction strips.

Take out one half. How many quarters do you need to make this length? How many sixths do you need? How many eighths do you need? How many twelfths do you need? Write down your results like this, putting numbers instead of the letters.

$$\frac{1}{2}=\frac{w}{4}=\frac{x}{6}=\frac{y}{8}=\frac{z}{12}$$

Now take out one third. Use the other strips to find out which numbers the letters stand for.

$$\frac{1}{3}=\frac{x}{6}=\frac{y}{12}$$

Take out two of the thirds. Use the other strips to complete this table.

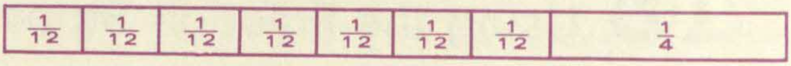
$$\frac{2}{3}=\frac{a}{6}=\frac{b}{12}$$

Use the strips to complete these tables.

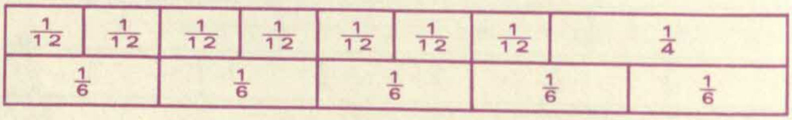
$$\frac{1}{4}=\frac{p}{8}=\frac{q}{12} \qquad \frac{3}{4}=\frac{x}{8}=\frac{y}{12} \qquad \frac{1}{6}=\frac{a}{12} \qquad \frac{5}{6}=\frac{b}{12}$$

Let us solve this equation: $\frac{7}{12} + \frac{1}{4} = x$

Take seven of the twelfths, and one quarter, and place them end to end.



Try to find some fractions to match this strip. See how many sixths will fit exactly.



$$\frac{7}{12}+\frac{1}{4}=\frac{5}{6}$$

PRACTICE 24 Use the fraction strips to solve these equations.

1) $\frac{1}{2} + \frac{1}{3} = a$

2) $\frac{1}{2} + \frac{1}{6} = b$

3) $\frac{1}{3} + \frac{1}{6} = c$

4) $\frac{1}{6} + \frac{1}{12} = d$

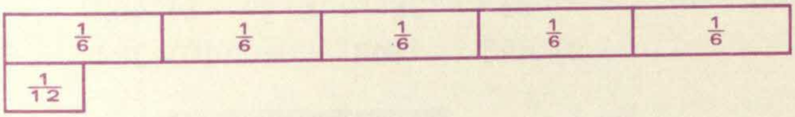
5) $\frac{1}{4} + \frac{1}{12} = m$ 6) $\frac{5}{12} + \frac{1}{3} = n$

7) $\frac{1}{3} + \frac{1}{4} = p$ 8) $\frac{5}{12} + \frac{1}{4} = q$

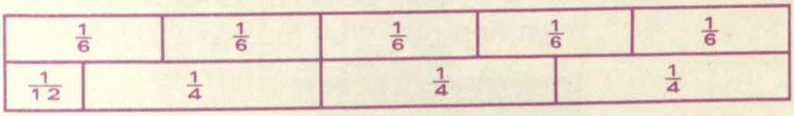
9) $\frac{3}{4} + \frac{1}{12} = r$ 10) $\frac{7}{12} + \frac{1}{6} = s$

Let us solve this equation: $\frac{5}{6} - \frac{1}{12} = y$

Take five of the sixths, and one of the twelfths, and put them side by side.



Try to find some fractions to fill the space. See how many quarters will fit exactly.



It needs three quarters to fill the space.

$$\frac{5}{6} - \frac{1}{12} = \frac{3}{4}$$

PRACTICE 25

Use the fraction strips to solve these equations.

1) $\frac{5}{6} - \frac{1}{3} = p$ 2) $\frac{3}{4} - \frac{1}{12} = q$

3) $\frac{2}{3} - \frac{5}{12} = r$ 4) $\frac{5}{6} - \frac{3}{4} = w$

5) $\frac{2}{3} - \frac{1}{2} = x$ 6) $\frac{11}{12} - \frac{1}{4} = y$

7) $\frac{3}{4} - \frac{5}{12} = z$ 8) $\frac{1}{3} - \frac{1}{12} = a$

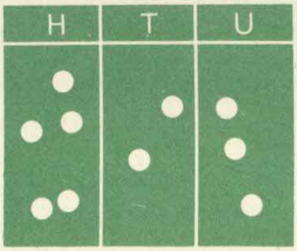
9) $\frac{7}{8} - \frac{1}{4} = b$ 10) $\frac{2}{3} - \frac{1}{6} = c$

14 Subtraction: HTU

You know that if we have to split a number into two sets, and we know what one of them is, we can find the other by subtraction. If you remember that each counter in the tens column is really ten units, you can do these easily.

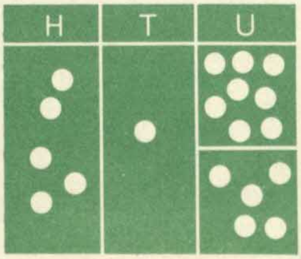
PRACTICE 26
1) 73 − 56 = x   2) 82 − 37 = y
3) 65 − 49 = z   4) 94 − 68 = p
5) 56 − 27 = q   6) 71 − 18 = a
7) 83 − 28 = b   8) 462 − 235 = c
9) 696 − 148 = x   10) 384 − 57 = y

Set out the number 523 on your abacus. Let us subtract 148. This means we want to split 523 into two groups. One of the groups is to be 148. We must find out what the other will be.



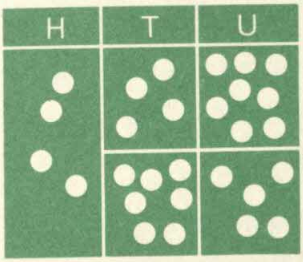
$$\begin{array}{rrrr} & 5 & 2 & 3 \\ - & 1 & 4 & 8 \\ \hline \end{array}$$

We cannot split the 3 so that one part is 8. Take one counter from the tens column, and instead put ten more counters in the units column.



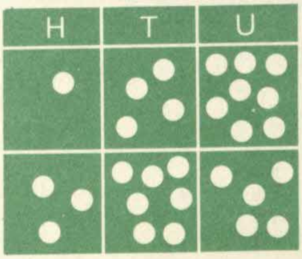
$$\begin{array}{rrrr} & 5 & \cancel{2}^{1} & {}^{1}3 \\ - & 1 & 4 & 8 \\ \hline & & & 5 \\ \hline \end{array}$$

Now we can split the 13 counters into 8 and 5. Look at the tens column. We cannot split the one counter there. Take one of the counters from the hundreds column, and instead put ten more counters in the tens column. Now we can split the 11 counters into 4 and 7.



$$\begin{array}{rccc} & \cancel{5}^{4} & \cancel{2}^{11} & {}^{1}3 \\ - & 1 & 4 & 8 \\ \hline & & 7 & 5 \\ \hline \end{array}$$

Now we can split the 4 counters in the hundreds column into 1 and 3.



$$\begin{array}{rccc} & \cancel{5}^{4} & \cancel{2}^{11} & {}^{1}3 \\ - & 1 & 4 & 8 \\ \hline & 3 & 7 & 5 \\ \hline \end{array}$$

PRACTICE 27

Try to do these without using your abacus. If you are not sure how to do a sum, you may use your abacus.

1) $743 - 368 = p$
2) $852 - 286 = q$
3) $561 - 185 = r$
4) $635 - 477 = s$
5) $820 - 358 = t$
6) $416 - 197 = x$
7) $603 - 144 = y$
8) $744 - 295 = z$
9) $410 - 232 = a$
10) $732 - 438 = p$
11) $862 - 419 = c$
12) $820 - 183 = d$
13) $707 - 478 = p$
14) $658 - 342 = q$
15) $631 - 261 = x$
16) $511 - 346 = y$
17) $471 - 397 = z$
18) $237 - 59 = a$
19) $682 - 74 = b$
20) $923 - 276 = c$

Sometimes, there is no figure in the tens column. Let us solve the equation $403 - 178 = x$.

$$\begin{array}{r} 4\ \ 0\ \ 3 \\ -\underline{1\ \ 7\ \ 8} \\ \underline{} \end{array}$$

We must remember that the 4 hundreds are the same as 40 tens. We take one of the tens, and this leaves 39 tens. Then we can subtract.

$$\begin{array}{r} \cancel{4}^{3}\ \ \cancel{0}^{9}\ \ {}^{1}3 \\ -\underline{1\ \ 7\ \ 8} \\ \underline{2\ \ 2\ \ 5} \end{array}$$

PRACTICE 28

Solve these equations.

1) $507 - 249 = x$
2) $302 - 136 = y$
3) $403 - 188 = z$
4) $304 - 165 = p$
5) $605 - 358 = q$
6) $500 - 216 = r$
7) $701 - 407 = a$
8) $802 - 294 = b$
9) $806 - 28 = c$
10) $603 - 279 = d$

PRACTICE 29

Write an equation for each of these. Solve the equation, then turn the answer back into words.

1) There are 316 books in our library. If there are 148 on the shelves, how many have been borrowed?

2) There are 403 children in the junior and infant school. 167 are infants. How many juniors are there?

3) At the tuckshop, we had a box holding a gross of biscuits. (1 gross = 144.) At the end of the week, there were 57 left. How many had we sold?

4) Helen has read 78 pages of her book. The book has 120 pages. How many more pages has she to read?

5) Our journey was 243 miles. At mid-day, we had gone 158 miles. How much further had we to go?

6) In a school cricket match, our opponents scored 207 runs. At tea time, our school had scored 184. How many runs did we need to draw level? How many did we need to win?

7) Robin has 752 stamps. Richard has 585. How many more must Richard collect to have as many as Robin?

8) Our holiday will cost £105. We have saved £78. How much more will we need?

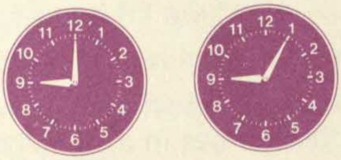
9) The grocer opened a box of 500 eggs. 14 of these were broken. How many could he sell?

10) The council planned to build on 256 plots. 70 of these plots were to have bungalows. How many houses would there be?

PRACTICE 30 Write a sensible story about each of these sums.

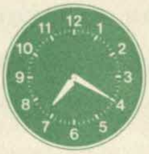
1) $328 - 262 = 66$
2) $416 - 259 = 157$
3) $531 - 176 = 355$
4) $250 - 185 = 65$
5) $643 - 348 = 295$

15 Telling the Time

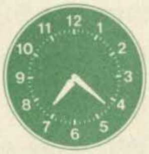


How many minutes have passed when the minute hand has moved from 12 to 1? How many minutes are there between any two numbers which are next to each other?

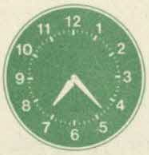
Often, it is enough to tell the **time** to the nearest five minutes. But sometimes we must be more accurate, perhaps because we must catch a train or a bus. Then, we need the time to the nearest minute.



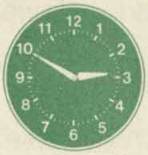
The time on this clock is 7.20, or 20 past 7.



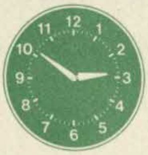
Now, it is 2 minutes later. It is 7.22, or 22 minutes past 7.



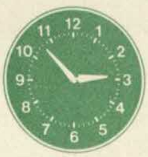
What is the time now?



The time on this clock is 2.50, or 10 to 3.



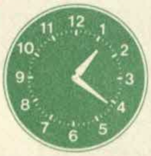
Now, it is 1 minute later. It is 2.51, or 9 minutes to 3.



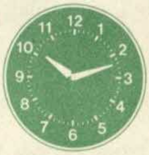
What time is it now?

PRACTICE 31 Write these times in a) the short way, b) the long way.

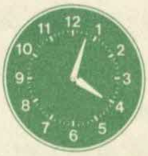
1)



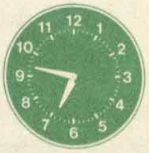
2)



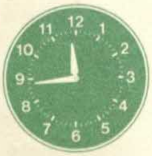
3)



4)



5)



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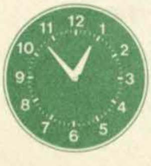

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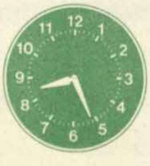

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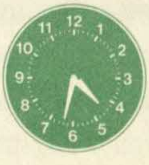
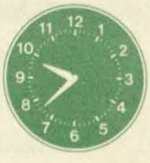
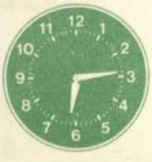


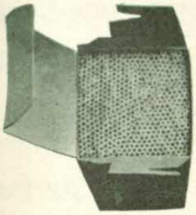
9)



10)



16 More Measuring



Take a full packet of drinking straws. Guess whether the straws in the packet, placed end to end, would stretch the length of your classroom. Check your estimate by measuring. Were you right? How could you find out if you had only one straw?

17 Reversals

You know that addition and subtraction are different ways of showing the same thing.

475 + 348 = 823
823 − 475 = 348
823 − 348 = 475

These all mean the same thing.

PRACTICE 32 For each of these stories, ask three different questions. Write a different equation for each question. Change each answer into words.

1) There are 204 children in the school. 117 are girls and 87 are boys.

2) In an election, Mr Green had 786 votes and Mr Brown had 816 votes, so Mr Brown won by 30 votes.

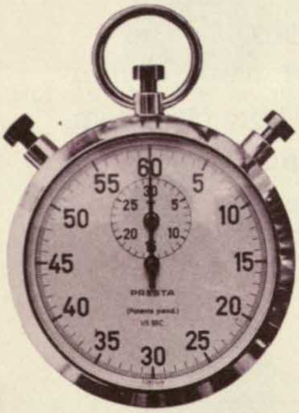
3) The baker had 180 cakes in the morning. At the end of the day, he had 27 left, so he knew he had sold 153 cakes.

4) There were 265 children at school, and there were 15 bottles of milk over, so we knew the milkman had left 280 bottles of milk.

5) 34 children ride to school on bicycles, or on the bus, or in cars. There are 271 children in the school, so 237 children walk to school.

18

How Long is a Minute?



You will find this easier if you work with a partner. You will need a watch with a second-hand, or better still, a stop-watch.

See if you can estimate one minute. Let your partner have the watch, and tell you to start when the hand is exactly over a minute mark. Tell your partner when you think a minute has gone. Was your guess too long or too short? Write down what you did and what you found out.

Guess how many you could count in a minute. Now try it. How good was your guess?

Now try estimating a minute again. You may count if you think it will help. Was your second attempt better than your first? Write down what you did.

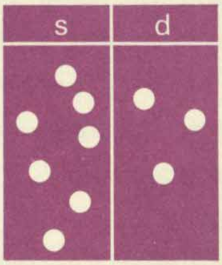
19

Dividing Shillings and Pence

Let us see if we can share 7s 3d equally among 3 children.

The sum we have to do is 7s 3d ÷ 3.

On your abacus, make 7s 3d.

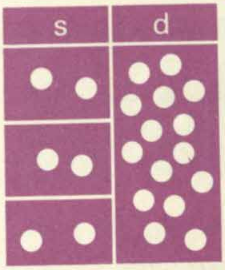


Write the sum in your book as you do it.

s d

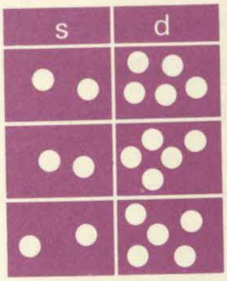
3)7 3

Divide the 7 shillings into 3 equal parts. There is one shilling over. Change this into 12 pennies. This makes 15 pennies altogether.



$$\begin{array}{ll} \text{s} & \text{d} \\ 2 & \\ \overline{)7} & {}^{15}\cancel{3} \end{array}$$

Divide the 15 pennies into 3 equal parts.



$$\begin{array}{lll} & \text{s} & \text{d} \\ & 2 & 5 \\ 3 & \overline{)7} & {}^{15}\cancel{3} \end{array}$$

PRACTICE 33 Use your abacus to do these.

1) 3s 2d ÷ 2
2) 4s 3d ÷ 3
3) 9s 4d ÷ 4
4) 6s 3d ÷ 5
5) 7s 4d ÷ 2
6) 6s 9d ÷ 3
7) 7s ÷ 4
8) 9s 11d ÷ 7
9) 1s 4d ÷ 2
10) 8s ÷ 3

PRACTICE 34 Do these without using your abacus.

1) 3s 4d ÷ 2
2) 9s 2d ÷ 2
3) 4s 9d ÷ 3
4) 7s 6d ÷ 3
5) 8s 8d ÷ 4
6) 6s 4d ÷ 4
7) 7s 1d ÷ 5
8) 9s ÷ 4
9) 7s 6d ÷ 6
10) 3s 8d ÷ 4
11) 10s 6d ÷ 3
12) 8s 9d ÷ 3
13) 16s 8d ÷ 4
14) 13s 4d ÷ 5
15) 16s 9d ÷ 3
16) 17s ÷ 6
17) 2s 3d ÷ 9
18) 16s. 4d ÷ 7
19) 14s 7d ÷ 5
20) 18s 8d ÷ 8

PRACTICE 35

Turn these questions into numbers. Find the answer in the easiest way, then turn it back into words.

1) 4 packets of tea cost 9s 8d. How much did one packet cost?

2) Father goes to work 6 days a week. He spends 9s 6d a week on buses. How much does he spend each day?

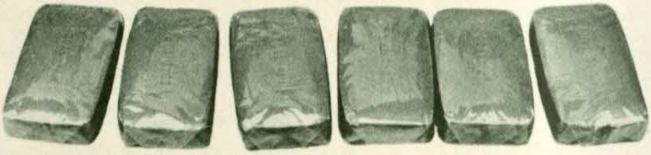
3) Mother pays the milkman 5s 10d for 7 pints of milk. How much is one pint?

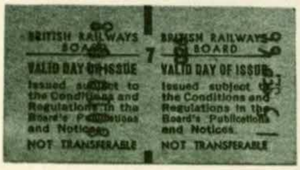
4) Jim wants to save 7s 4d in 4 weeks. How much must he save each week?

5) Uncle gave 7s to the 3 children. How much should they each have had?

6) 4 lb of sugar cost 3s 4d. How much did 1 lb cost?

7) Judy bought 6 tablets of soap, which cost 8s 6d. How much would one tablet cost?





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8) Mother paid 5s 9d for 3 packets of cornflakes. How much a packet were they?

9) Father and Mother paid 7s 6d for their train fares. How much was each fare?

10) A prize of 10 shillings was won by 3 children. How much should each have?

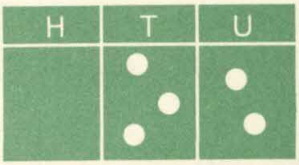
PRACTICE 36

Write a sensible story about each of these.

1) 13s 9d ÷ 3 = 4s 7d
2) 19s 2d ÷ 5 = 3s 10d
3) 17s 3d ÷ 9 = 1s 11d
4) 18s 8d ÷ 7 = 2s 8d
5) 19s ÷ 6 = 3s 2d

20 Counting On in Hundreds

Make the number 32 on your abacus, and write 32 in your book.



Put a counter in the hundreds column, and write down the number you have. Put another counter in the hundreds column, and write down the number. Keep adding counters to the hundreds column, writing the new number down each time, until you have nine counters in the hundreds column. Look at the numbers you have written. What do you notice about the tens and the units? What always happens to the tens and units when you add on hundreds?

PRACTICE 37 Put the right numbers instead of the letters in these series.

1) 45, 145, 245, x, 445, 545, y, 745
2) 737, 637, p, 437, q, 237
3) 562, a, b, 862, 962
4) 518, 418, x, 218, 118, y
5) p, q, 493, 393, 293, 193

PRACTICE 38 Count on in hundreds from these numbers, getting as near to a thousand as you can without passing it. (A thousand is ten hundreds.) Write down each number as you say it.

1) 576 2) 492 3) 659 4) 283 5) 360
6) 148 7) 34 8) 407 9) 311 10) 225

PRACTICE 39 Do these by counting on in hundreds.

1) $415 + 500 = x$
2) $177 + 700 = y$
3) $42 + 800 = z$
4) $353 + 600 = p$
5) $124 + 500 = q$
6) $286 + 600 = r$
7) $209 + 700 = s$
8) $398 + 500 = a$
9) $460 + 300 = b$
10) $131 + 800 = c$

21

Dinner Money

When the school secretary has the dinner money, she has to count it before taking it to the bank. She does this by putting the money into piles.

She puts the half-crowns into piles of eight. Why?

She puts the florins into piles of ten. Why?

She puts the shillings into piles. How many shillings will be in each pile? Why?

To take the money to the bank, she puts the half-crowns, florins and shillings into strong paper bags marked "£5 SILVER".

She puts the sixpences into bags marked "£1 in SIXPENCES". How many sixpences would she put in each bag?

The threepenny pieces she puts into piles of four. Why? Then she puts them into bags marked "10s in THREEPENNY PIECES". How many would she put in each bag?

The pennies and halfpennies are put into piles of one shilling, and then into bags marked "5s COPPER". How many pennies would she need to fill one of these bags?

There may be some coins left over, and these are kept separate.

The pound notes and ten-shilling notes are also kept separate.

All the money is entered on a *paying in slip*, and added up. The *total* is put at the bottom.

	£	s	d
Notes—£5	—	—	—
„ £1	2	–	–
„ 10s	1	–	–
Silver	12	2	–
Nickel 3d pieces	—	10	6
Copper	—	15	6
TOTAL ..	16	8	—

22 Counting On in Pounds

Every time you count 20 shillings, you have counted £1. If you count "20, 40, 60 shillings", how many pounds have you counted?

PRACTICE 40 How many pounds are there in these shillings?

1) 40s 2) 80s 3) 100s 4) 60s
5) 140s 6) 180s 7) 120s 8) 160s
9) 200s 10) 240s

There may be some shillings over. Perhaps you have 64 shillings. Count till you get as near to 60 as you can without passing it. You will say, "20, 40, 60, and 4." 64 shillings is £3 4s.

PRACTICE 41 How many pounds and shillings are there in these?

1) 42s 2) 87s 3) 69s 4) 146s
5) 205s 6) 53s 7) 38s 8) 71s
9) 132s 10) 114s

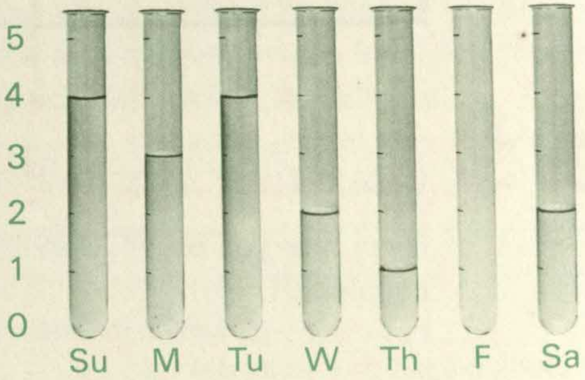
23 Graphs

Each day, the weather monitors in the class had to look at the rain gauge and write down how much rain had fallen. Here is what they wrote.

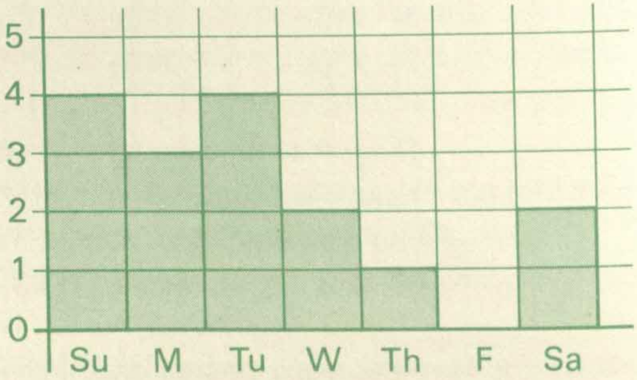
Rainfall in tenths of an inch

Su	M	Tu	W	Th	F	Sa
4	3	4	2	1	0	2

These numbers tell us something about how much rain fell. But we could see more easily if we drew some pictures. This is what the weather monitors saw.



To make this easier to draw, they turned it into a block graph.



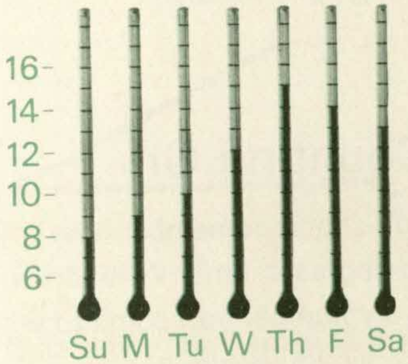
They chose to measure the rain each day. Where did they put the days? Why did they put the amount of rain up the vertical axis?

They also had to look at the thermometer every day, and write down the temperature. Here is what they wrote.

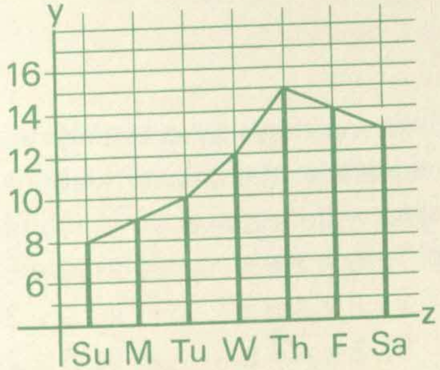
Temperature in degrees centigrade

Su	M	Tu	W	Th	F	Sa
8	9	10	12	15	14	13

This is what they saw.



They turned this into a graph, too. But instead of drawing blocks, they drew lines perpendicular to the horizontal axis.



Then they joined the tops of the perpendiculars. This is called a **line graph,** because the tops are joined by a line.

When we draw a line graph, we call the horizontal axis the *x-axis*, and the vertical axis the *y-axis*. Do the things we chose go on the x-axis or the y-axis? Where do we put the measurements we have found?

24 Line Graphs

Use one of the sets of numbers you collected for the histograms on page 14, and make out a table. Then draw a line graph.

Collect some more sets of numbers (such as marks you have had in tests, or the goals scored by your football or netball team). Make tables, and draw line graphs for them.

25 Counting On

You should remember how to count on without adding each time. Write down 2, then write down every number you come to when you count on in 2's, till you reach 20.

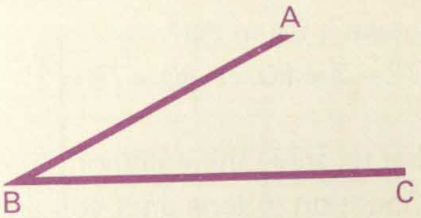
Do the same starting with 3, and going up to 30. Then do the same with 4 up to 40, 5 up to 50, 6 up to 60 and 8 up to 80.

PRACTICE 42 Answer these by counting on. Of course, if you can remember the answer without counting on, you can just write it down.

1) $8 \times 2 = x$
2) $6 \times 5 = y$
3) $8 \times 3 = z$
4) $9 \times 3 = p$
5) $8 \times 4 = q$
6) $9 \times 2 = r$
7) $6 \times 4 = s$
8) $7 \times 2 = a$
9) $6 \times 3 = b$
10) $7 \times 8 = c$
11) $8 \times 6 = d$
12) $9 \times 4 = e$
13) $6 \times 6 = f$
14) $7 \times 4 = g$
15) $9 \times 5 = h$
16) $8 \times 8 = k$
17) $9 \times 6 = m$
18) $7 \times 3 = n$
19) $9 \times 8 = p$
20) $7 \times 6 = q$

26 Naming Angles

How do we name a line? We can name an angle by using three capital letters. The letter at the point always goes in the middle. Instead of writing the word "angle" every time, we put ∠ or ∧ . This angle is called *angle ABC*, and is written ∠ ABC. or $A\hat{B}C$.



PRACTICE 43 Write down the names of these angles.

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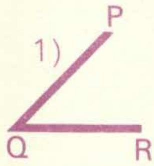

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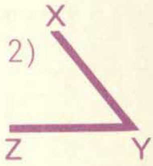

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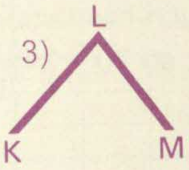

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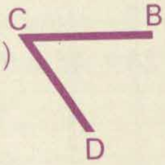

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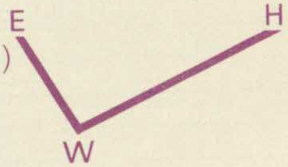
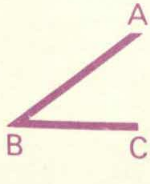
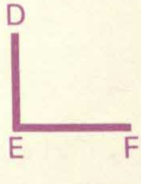
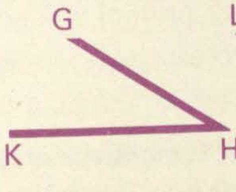
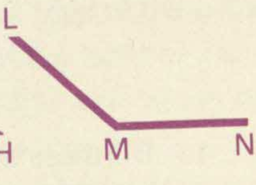


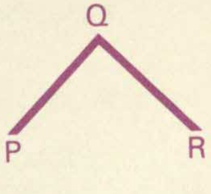
PRACTICE 44 You should remember how to test a right-angle by using a folded paper, or the corner of a page. Which of these angles are acute angles, which are obtuse angles and which are right-angles?

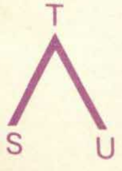


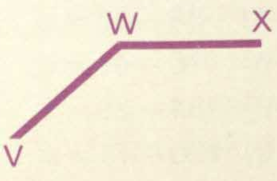


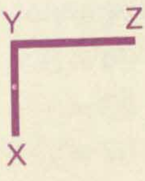


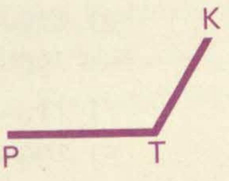


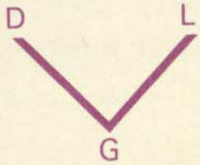












27 Another Way of Subtracting

You know how the shopkeeper gave change by counting on from the amount you were paying till he reached the amount you gave him. This was his way of subtracting.

We can subtract numbers by adding, too.

Sometimes, this is the easiest way. Let us solve the equation $80 - 78 = x$. What must we add to 78 to make it up to 80?

$78 + 2 = 80$, so $80 - 78 = 2$

Let us solve the equation $70 - 24 = p$.

Count on in tens until you are as near to 70 as you can get without passing it. You will say, "34, 44, 54, 64". How much have you added to the 24? What must you add now to the 64 to make it up to 70? How much have you added altogether?

$24 + 46 = 70$, so $70 - 24 = 46$

PRACTICE 45 Do these in the same way.

1) $60 - 57 = x$ 2) $40 - 31 = y$
3) $80 - 52 = z$ 4) $70 - 23 = p$
5) $50 - 18 = q$ 6) $60 - 35 = r$
7) $100 - 36 = a$ 8) $120 - 89 = b$
9) $140 - 78 = c$ 10) $110 - 64 = d$

PRACTICE 46 Do these in whichever way you find easiest.

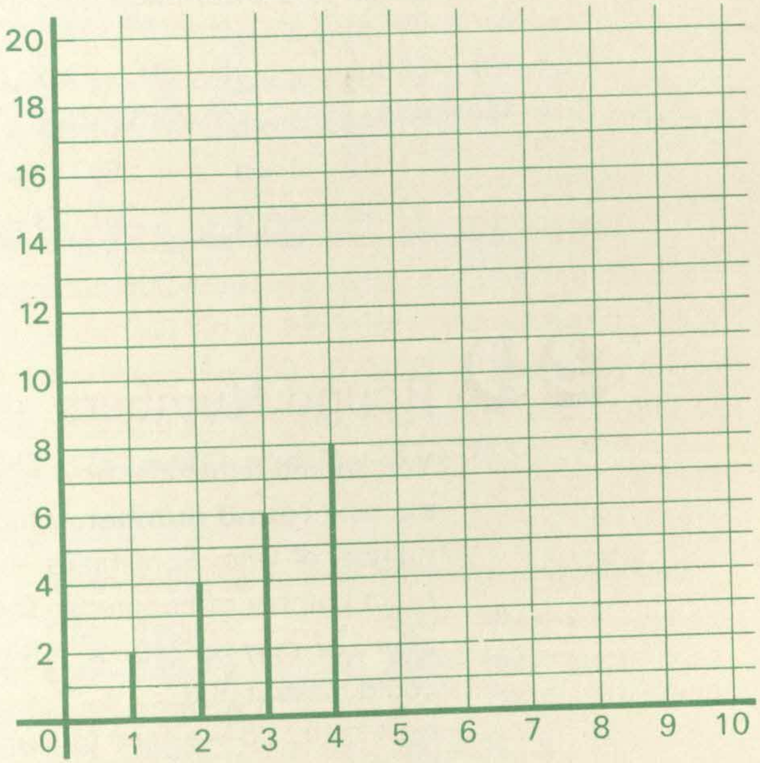
1) $80 - 34 = p$ 2) $60 - 27 = q$
3) $120 - 76 = r$ 4) $53 - 38 = a$
5) $90 - 54 = b$ 6) $70 - 45 = c$
7) $110 - 83 = d$ 8) $84 - 29 = x$
9) $100 - 62 = y$ 10) $130 - 71 = z$

28 More Line Graphs

Make a table like this, by counting on in 2's.

x - axis	1	2	3	4	5	6	7	8	9	10
y - axis	2	4	6	8	10	12	14	16	18	20

Draw a frame like this, and on it draw a perpendicular for each of the numbers on the y-axis.



The line joining the tops of the perpendiculars will be a picture of the table of 2's.

What shape is the line joining the tops? What is the easiest way to draw this line?

Put a ring round the point that shows that $5 \times 2 = 10$.

Put a ring round the point that shows that $8 \times 2 = 16$.

On the graph, show that $3\frac{1}{2} \times 2 = 7$. Find from the graph what $5\frac{1}{2} \times 2$ is. Find what $15 \div 2$ is. Find what $19 \div 2$ is.

Make a table by counting on in 3's, and draw a graph on the same frame, as far as you can. What shape is the line? How many points did you need to mark before you could draw it?

Make a table by counting on in 4's. What will be the shape of the graph? Mark in the points for 1 × 4 and for 6 × 4, and draw the graph. Use the last graph to answer these questions.

1) $2\frac{1}{2} \times 4 = x$ 2) $4\frac{1}{2} \times 4 = y$
3) $3\frac{1}{4} \times 4 = z$ 4) $5\frac{1}{4} \times 4 = a$
5) $4\frac{3}{4} \times 4 = b$ 6) $14 \div 4 = c$
7) $22 \div 4 = d$ 8) $17 \div 4 = p$
9) $15 \div 4 = q$ 10) $23 \div 4 = r$

29 Round Numbers

You should remember how to make a number up to the next **round number,** which is the next exact number of tens. Sometimes, a round number is an exact number of hundreds. The next round number after 237 may be 240, or, if it is more useful, we could make it 300.

How many do we need to make 237 up to 240?
How many more do we need to make the 240 up to 300?
How many do we need altogether?

$$237 + 3 + 60 = 237 + 63 = 300$$

PRACTICE 47 Make these numbers up to the next exact number of hundreds. Set them out like the example above.

1) 486 2) 579 3) 258 4) 724 5) 361
6) 813 7) 132 8) 607 9) 48 10) 465

This is another way of subtracting by counting on. Let us solve the equation $500 - 426 = x$. Make the 426 up to 500. $426 + 4 + 70 = 500$

$426 + 74 = 500$, so $500 - 426 = 74$

PRACTICE 48 Do these in the same way, showing your working.

1) $600 - 563 = x$ 2) $700 - 678 = y$
3) $400 - 316 = z$ 4) $800 - 747 = a$
5) $900 - 821 = b$ 6) $100 - 59 = c$
7) $200 - 105 = d$ 8) $500 - 492 = p$
9) $300 - 230 = q$ 10) $600 - 584 = r$

We can go further than this. Let us solve the equation $600 - 347 = a$. How many do we need to make the 347 up to 400? How many more do we need to make the 400 up to 600? How many do we need altogether? $347 + (3 + 50 + 200) = 600$

$347 + 253 = 600$, so $600 - 347 = 253$

PRACTICE 49 Do these in the same way, showing your working.

1) $700 - 488 = x$ 2) $900 - 567 = y$
3) $500 - 249 = z$ 4) $800 - 452 = a$
5) $400 - 125 = b$ 6) $500 - 74 = c$
7) $600 - 206 = d$ 8) $700 - 291 = p$
9) $800 - 280 = q$ 10) $600 - 315 = r$

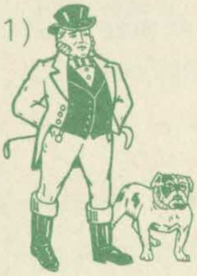
PRACTICE 50 Do these, without showing your working, in the way you find easiest.

1) $700 - 569 = a$ 2) $500 - 243 = y$
3) $900 - 618 = c$ 4) $600 - 472 = d$
5) $700 - 202 = p$ 6) $400 - 173 = q$
7) $800 - 740 = r$ 8) $500 - 36 = x$
9) $600 - 351 = y$ 10) $800 - 490 = z$

30 Symbols

What is this? It is not a car. It is not really a picture of a car. It is something which *stands* for a real car. A thing which stands for something else is called a **symbol.** Here are some other symbols. Find out what each symbol stands for.

1)



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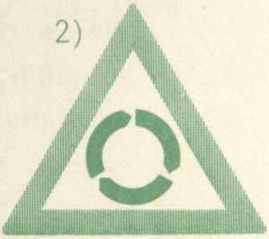

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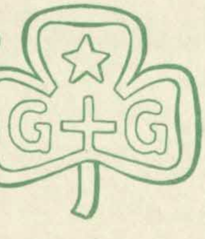

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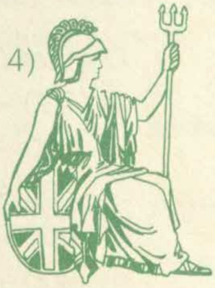

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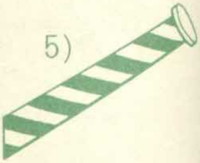
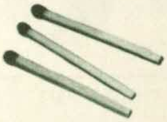


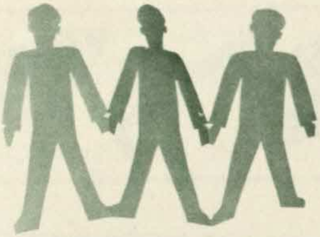
Find some more symbols, and say what they stand for.

In mathematics, we use many symbols. Here are a few that you know. Say what they mean.

$+ \quad £ \quad = \quad \angle \quad \div$

Numbers are symbols. When we say "five" or write "5", we are using a symbol.



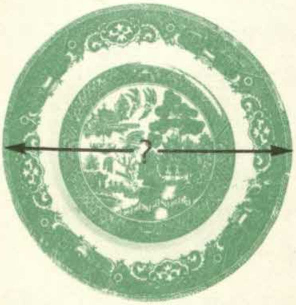


What is the same about these? What symbol do we use to stand for this?

Do not make the mistake of thinking that numbers are real things. They are only symbols, which tell us something about real things.

31

How Big is a Plate?



Take a plate, and look at it. What shape is it? Estimate how wide it is at its widest part, and write down your guess. Now measure it. How can you be sure you have measured the widest part?

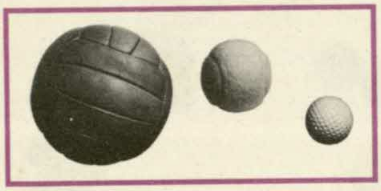
The distance across the widest part is the **diameter.** Estimate the distance all round the outer edge, and write down your guess. Now measure it. How did you do it? This distance is called the **circumference.** Draw a **circle,** and on it mark the circumference and the diameter.

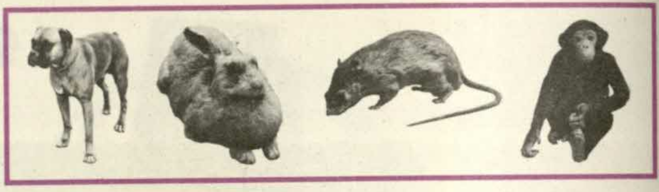
32

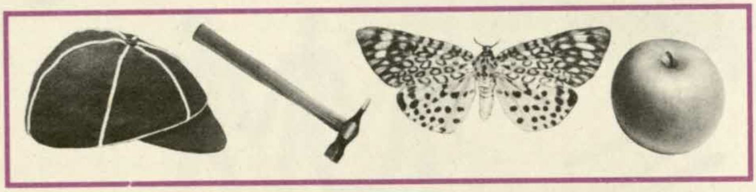
Sets

Many people like collecting things. Perhaps you collect stamps, or coins, or shells.

In mathematics, a collection of things is called a **set.** A set can be made up of *any* number of *any* things.







Here are pictures of some sets. They are not sets; they are only symbols which stand for the sets. Each thing which is part of a set is called a **member** of that set. The set of balls shown above has three members. The set of animals has four members.

PRACTICE 51 Write out the names of the members of each of these sets.

1) The set of all the days of the week.
2) The set of all the vowels.
3) The set of months whose names begin with J.
4) The set of whole numbers between 4 and 9.
5) The set of even numbers with one figure.

PRACTICE 52 How many members are there in each of these sets?

1) The set of all the months of the year?
2) The set of all the people who live in your house.
3) The set of all teachers in your school.
4) The set of Kings of England named John.
5) The set of all days whose names begin with S.
6) The set of all days whose names begin with P.
7) The set of all even numbers between 5 and 7.
8) The set of all odd numbers between 5 and 7.
9) The set of all the letters of the alphabet.
10) The set of all children in your school who are more than 9 ft tall.

33 The Empty Set

What is the smallest set you can have? A set which has no members is called a **null** set. Sometimes it is called the **empty set.**

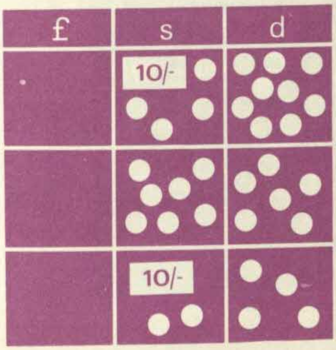
PRACTICE 53 1) Write down the names of three sets which you can see in your classroom.

2) Write down the names of three sets which have only one member.

3) Write down the names of three null sets.

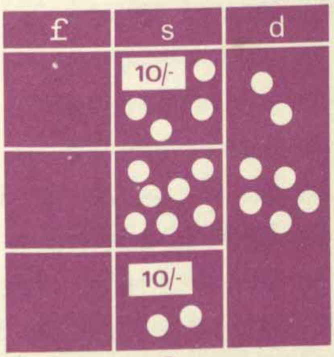
34 Addition of Money

On your £ s d abacus, make 14s 9d, 7s 6d and 12s 4d. Use ten-shilling notes.



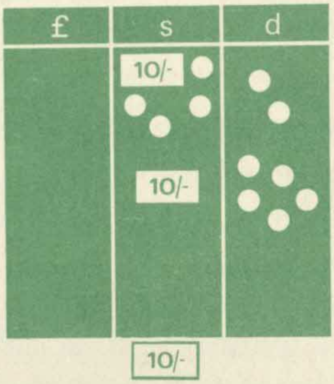
£	s	d
	14	9
	7	6
	12	4

Put the 19 pennies together, and turn them into 1 shilling and 7 pennies.



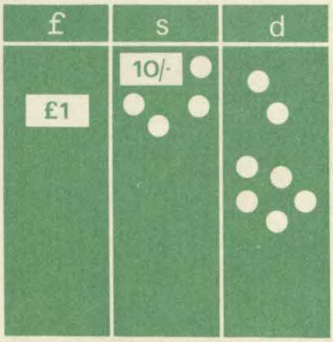
£	s	d
	14	9
	7	6
	12	4
	1	
		7

Put the shillings together. There are 14 shillings. Change 10 of them into a ten-shilling note, and leave 4 shillings.



£	s	d
	14	9
	7	6
	12	4
	11	
	4	7

There are 3 ten-shilling notes. Change 2 of them into a £1 note, and leave one in the shillings column.



£	s	d
	14	9
	7	6
	12	4
	11	
1	14	7

PRACTICE 54 Use your abacus to do these.

1) 16s 3d + 12s 5d
2) 15s 7d + 13s 8d
3) 17s 4½d + 16s 8d
4) 18s 6½d + 15s 9½d
5) 13s 8d + 12s 3d + 11s 4d
6) 10s 6d + 4s 2d + 18s 7d
7) 16s 7½d + 18s 4d + 15s 2½d
8) 13s 4½ + 11s + 15s 11d
9) £1 14s 1d + £2 9s 8½d + £1 17s 6d
10) £3 16s 5½d + 19s 2½d + £2 11s 8½d

PRACTICE 55

Do these without using your abacus.

1) 14s 6d + 13s 2d
2) 11s 9d + 15s 5d
3) 19s 8½d + 18s 9d
4) 16s 11½d + 18s 7½d
5) 11s 4d + 10s 9½d + 15s 7d
6) 17s 1d + 13s 9½d + 5s 4½d
7) 15s 9d + 10s 11d + 14s 2d
8) 12s 10½d + 14s + 16s 6d
9) £2 19s 8½d + £3 12s 5d + £1 7s 6½d
10) £1 13s 4d + £2 16s 8½d + £4 15s 6d

PRACTICE 56

Write these questions in numbers, and work out the answers. Turn each answer back into words.

1) Father bought a shirt for £1 12s 6d, a tie for 10s 9d and a pair of shoes for £2 15s 11½d. How much did he pay altogether?

2) Mother bought a blanket for £2 15s 9d, a pair of sheets for £2 2s 6d and a bedspread for £1 9s 6d. How much did they cost her altogether?

3) On Red Cross Flag Day, Class 1 collected £1 14s 7d, Class 2 £1 16s 9½d and Class 3 £1 8s 11½d. How much did they collect altogether?

4) In the morning, the bus conductor took £5 16s 9d. In the afternoon he took £3 15s 7d. How much did he take that day?

5) On Sports Day, we took £3 12s 6d for tickets, £1 14s 3d for programmes and £5 9s 8d for refreshments. How much did we take altogether?

6) Last week, Mother paid the butcher £1 13s 9½d, the baker 16s 10½d and the grocer £3 18s 4½d. How much did her weekly bills come to?

7) On the first night of the concert we took £3 17s 5d, on the second night £4 11s 10d and on the third night £3 19s 6d. How much did we take altogether?

8) A tea-pot set cost £3 13s 8d, matching cups and saucers cost £1 18s 6d and the plates were £1 10s 4d. How much did the complete set cost?

9) On the class outing, the fares cost £5 18s 3d, the refreshments were £3 8s 9d and the admissions were £3 19s 9d. How much did the outing cost?

10) Father paid £10 17s 6d for a power drill. Mother bought him a saw for it costing £2 15s 9d, and Uncle bought him a set of drills for £2 3s 6d. How much did Father's complete set cost?

PRACTICE 57 Write a sensible story about each of these sums.

1) £6 7s 4d + £3 13s 2d + £1 10s 11d = £11 11s 5d
2) £5 12s 8d + 18s 7d + £2 8s 2d = £8 19s 5d
3) £4 19s 5d + £3 14s 4d + 17s 1d = £9 0s 10d
4) £6 2s 8d + £2 14s 7d + £2 3s 10 = £11 1s 1d
5) £1 16s 9d + £2 17s 4d + £1 2s 6d = £5 16s 7d

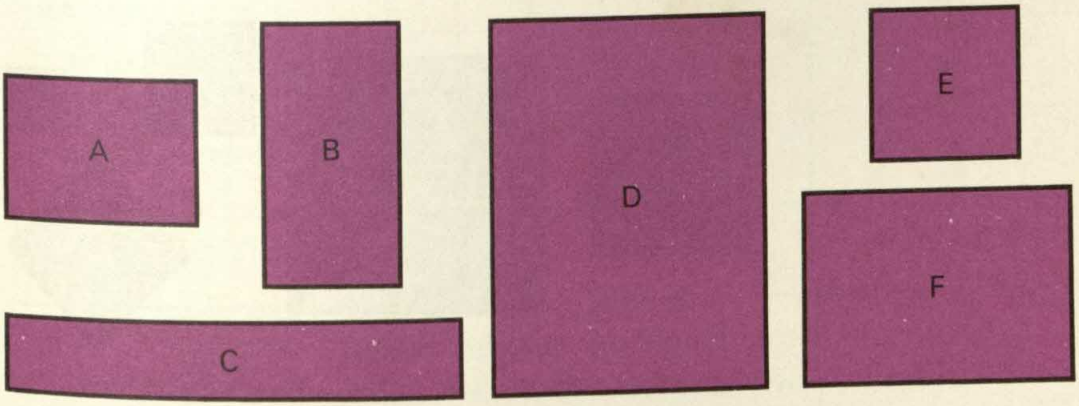
35 Counting On in Sevens

Starting with 7, count on in 7's till you reach 70. Write down the numbers you get, and look at them. Which numbers are odd? Which numbers are even? What do you notice about the way the odd and even numbers are arranged? Look at the units figure in each number. Write them down in order of size. What do you notice? Practise "saying on" in 7's until you can do it without counting in ones.

PRACTICE 58 Put the right numbers in place of the letters in these series.

1) 7 14 x 28 35 y 49 56
2) 63 56 p 42 35 q 21 14
3) 21 28 a b 49 56 63
4) p q 49 56 63 70
5) 42 x y 21 14 7

36 Shapes



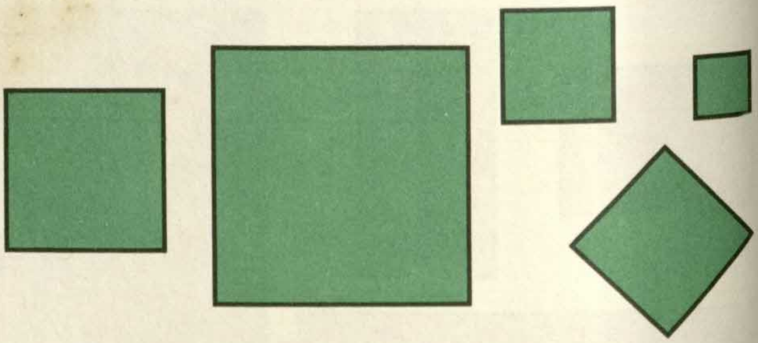
Look at these shapes. How many straight lines are there in the first shape? How many right-angles are there? How many pairs of **parallel** lines are there? Measure these parallel lines. What do you find?

PRACTICE 59 Make a table like this.

SHAPE	A	B	C	D	E	F
How many straight lines are there?	4					
How many right-angles are there?	4					
How many pairs of parallel lines?	2					
How many pairs of equal lines?	2					

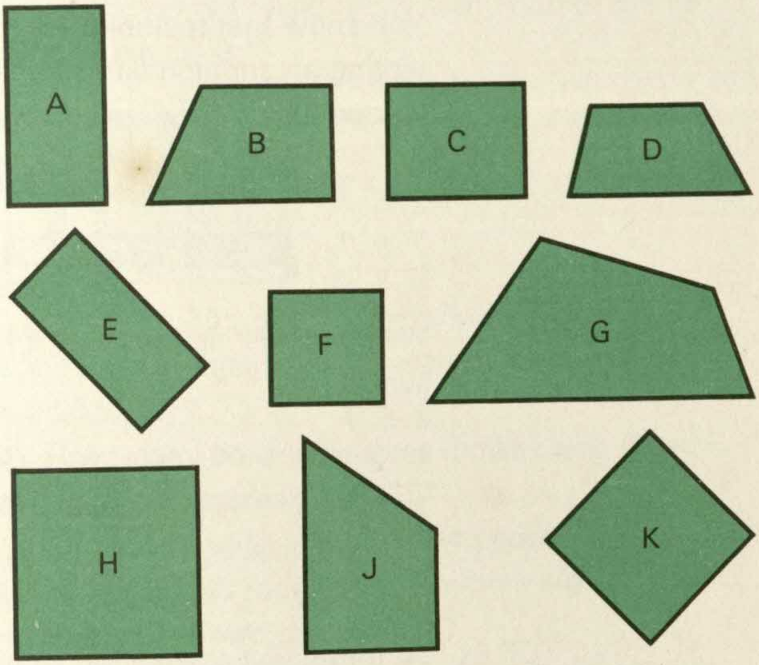
Fill in the numbers for each shape. Each of these shapes is a **rectangle.** "Rectangle" comes from two words meaning "right-angle". The long side of a rectangle is called the **length.** The short side is called the **breadth.** Look at the table you have made. What does a rectangle always have? Are all the rectangles the same shape? Are they all symmetrical? How many axes of symmetry does each have?

Pick out the shape that has something the others do not have. What do you notice about the four sides? What can you say about the length and the breadth? This special kind of rectangle is called a **square.** Look at these squares.



Are they all the same size? Are they all the same shape? Are they all symmetrical? Turn the page sideways, and look again. Are they still the same shape? What is a rectangle? What is a square? Draw a square and put in all the axes of symmetry.

PRACTICE 60 Each of these shapes is a **quadrilateral.**



Make a table like this, and fill it in for each shape.

SHAPE	A	B	C	D	E	F	G	H	J	K
How many sides are there?	4	4								
How many right-angles are there?	4	2								
How many pairs of parallel sides?	2	1								
Are the parallel sides equal?	yes	no								
Are all the sides equal?	no	no								

Which question has the same answer for every shape? What does a quadrilateral always have? ("Quadri-lateral" means "four-sided".) Which of the quadrilaterals are rectangles? Which of them are squares? Which of them are neither squares nor rectangles?

37

Multiplication is Addition

You know that multiplication is a quick way of writing an addition sum. $257 + 257 + 257$ can be written 257×3. Let us do this as an addition sum.

$$\begin{array}{r} 2\ 5\ 7 \\ 2\ 5\ 7 \\ 2\ 5\ 7 \\ \hline 7\ 7\ 1 \\ \hline \end{array}$$

We could just as easily set it out as a multiplication sum.

$$\begin{array}{r} 2\ 5\ 7 \\ \times\ 3 \\ \hline 7\ 7\ 1 \\ \hline \end{array}$$

PRACTICE 61 Do these, first as addition sums, then as multiplication.

1) $284 + 284 + 284 = x$
2) $123 + 123 + 123 + 123 + 123 = y$
3) $476 + 476 = z$
4) $236 + 236 + 236 + 236 = a$
5) $168 + 168 + 168 = b$

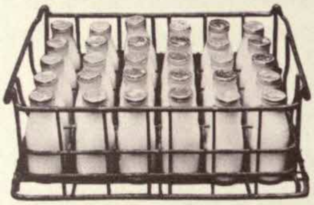
PRACTICE 62 Do these as multiplication sums.

1) $256 \times 3 = p$
2) $467 \times 2 = q$
3) $148 \times 4 = r$
4) $67 \times 5 = a$
5) $385 \times 2 = b$
6) $255 \times 4 = c$
7) $173 \times 5 = d$
8) $234 \times 3 = x$
9) $115 \times 7 = y$
10) $142 \times 6 = z$

PRACTICE 63 Write an equation for each question, solve it, then turn the answer back into words.

1) A grocer ordered 6 gross of eggs. (A gross is 144.) How many eggs did he order?

2) The milkman brought 115 bottles of milk each day of the school week. How many bottles did he bring in the week?



3) There are 365 days in an ordinary year. How many days are there in two years, if neither of them is a leap year?

4) How many boxes can three lorries carry, if each can carry 256 boxes?

5) The concert hall will seat 294 people. If all the tickets were sold for each of the three nights, how many people heard the concert?

6) Each box held 192 tins of meat. How many tins would there be in 5 boxes?

7) The train had six coaches, each with seats for 128 people. How many passengers could be seated in the train?

8) One box holds 120 sticks of chalk. If there are 8 full boxes in the cupboard, how many sticks of chalk are there?

9) The gardener in the park had 2 gross each (288) of daffodils, hyacinths and crocuses. How many bulbs did he have?

10) Each crate held 240 apples. How many apples were there in 3 crates?

38 The Timetable

	a.m.	a.m.	p.m.
Art Gallery	8.10	8.25	4.55
Brent Street	8.13	8.28	4.58
Christchurch	8.15	8.30	5.00
Downley Road	8.19	8.34	5.04
Eaton Square	8.22	8.37	5.07
Fish Market	8.25	8.40	5.10

This is part of the **time-table** at the bus-stop. Try to answer these questions.

PRACTICE 64 How long does the bus take to go from

1) The Art Galley to Brent Street?
2) Christchurch to Downley Road?
3) The Art Gallery to Christchurch?
4) Christchurch to Eaton Square?
5) Downley Road to the Fish Market?
6) Brent Street to Eaton Square?
7) Christchurch to the Fish Market?
8) The Art Gallery to Eaton Square?
9) Brent Street to the Fish Market?
10) The Art Gallery to the Fish Market?

PRACTICE 65 At what time would I arrive if I caught a bus:

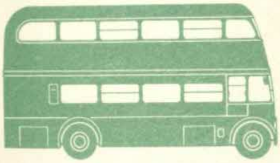
1) At 8.25 a.m. from the Art Gallery to Downley Road?
2) At 8.30 a.m. from Christchurch to Eaton Square?
3) At 5.04 p.m. from Downley Road to the Fish Market?
4) At 8.13 a.m. from Brent Street to Eaton Square?
5) At 4.58 a.m. from Brent Street to Downley Road?

PRACTICE 66 How long would I have to wait for a bus if I reached the bus stop at

1) The Art Gallery at 8.06 a.m.?

2) Downley Road at 8.32 a.m.?
3) Christchurch at 4.57 p.m.?
4) Eaton Square at 18 minutes past 8?
5) Brent Street at 10 minutes to 5?

PRACTICE 67 What time is the next bus if I reach the bus stop at



1) Eaton Square at 5 p.m.?
2) Brent Street at 8.20 a.m.?
3) Downley Road at half past 8?
4) The Art Gallery at a quarter past 8?
5) Christchurch at ten to 5?

39

The Set of Weights

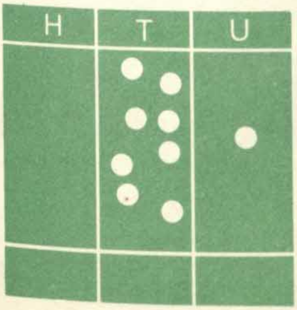
Examine the set of **weights.** Arrange them in order of size. What do you notice about each weight and the one next to it?

Write out the weights in order. What is the heaviest weight you could weigh? Can you think of any weight less than this that you could not find with the set of weights?

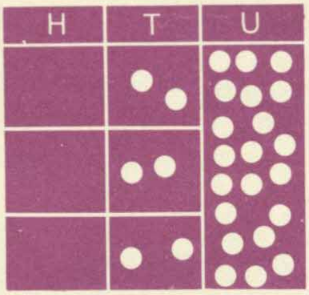
Can you balance the weights against each other in any way? Say what you think about your results.

40

Dividing Tens and Units

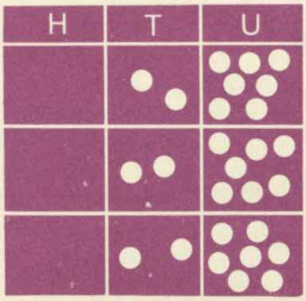


Make the number 81 on your abacus. Let us divide it into 3 equal parts.



Divide the 8 tens into 2 and 2 and 2. There are 2 counters over. We must change them into units. The 2 tens become 20 units. Put these with the one counter already there.

$$\begin{array}{r} 2\phantom{{}^{2}1} \\ 3\overline{)8\,{}^{2}1} \end{array}$$



Divide the 21 units into 7 and 7 and 7.

$$\begin{array}{r} 2\;\;7 \\ 3\overline{)8\,{}^{2}1} \end{array}$$

We can set this out in a frame like this $\begin{array}{r} 27 \\ 3\overline{)81} \end{array}$,

or like this $\begin{array}{r} 3\underline{)\,81} \\ 27 \end{array}$, or we can set it out as an

equation like this, $81 \div 3 = 27$, or like this $\frac{81}{3} = 27$.

PRACTICE 68 Do these using your abacus. Set them out in whichever way you find easiest.

1) $78 \div 2 = x$ 2) $72 \div 3 = y$ 3) $65 \div 5 = z$
4) $56 \div 4 = p$ 5) $84 \div 3 = q$

PRACTICE 69 Do these without using your abacus.

1) $32 \div 2 = a$ 2) $75 \div 3 = b$ 3) $64 \div 4 = c$
4) $51 \div 3 = d$ 5) $54 \div 2 = x$ 6) $92 \div 4 = y$
7) $95 \div 5 = z$ 8) $76 \div 2 = p$ 9) $87 \div 3 = q$
10) $72 \div 4 = r$ 11) $74 \div 2 = s$ 12) $30 \div 2 = x$
13) $57 \div 3 = y$ 14) $90 \div 6 = z$ 15) $96 \div 4 = a$
16) $85 \div 5 = b$ 17) $98 \div 7 = c$ 18) $78 \div 3 = d$
19) $78 \div 6 = p$ 20) $90 \div 5 = q$

PRACTICE 70 Write an equation for each question, and solve it. Then turn the answer back into words.

1) There were 48 toffees in the tin. If they were shared among 3 children, how many did they each have?

2) The gardener planted 68 rose bushes in 4 rows. How many should he put in each row?

3) There are 34 children in the class, and they sit two at each desk. How many desks do they need?

4) We bought 60 yards of braid to make bands for 4 teams. How much braid did each team use?

5) The farmer had 5 chicken coops to hold 75 chickens. How many chickens did he put in each coop?

6) 84 eggs are to be packed into boxes of 6. How many boxes will be needed?

7) 58 boys were to travel in 2 coaches. How many boys should travel in each coach?

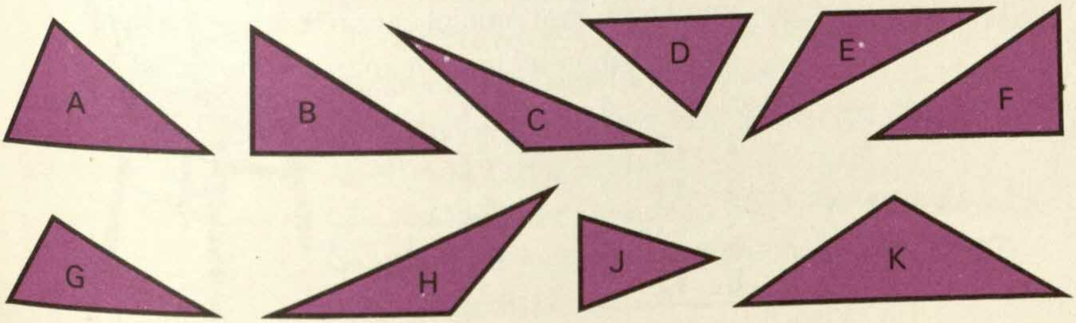
8) At school dinners, children sit 6 to each table. How many tables would be needed for 96 children?

9) There were 5 book-racks in the classroom, and 70 books. How many books should go in each rack?

10) The milk book has 52 pages. If we fill 4 pages each term, for how many terms would the book last?

41 Triangles

Look at these shapes.



PRACTICE 71 Make a table like this, and fill it in for each shape.

SHAPE	A	B	C	D	E	F	G	H	J	K
How many sides are there?	3	3								
How many angles are there?	3	3								
Is there a right-angle?	no	yes								
Is there more than one right-angle?	no	no								
Is there an obtuse angle?	no	no								
Is there more than one obtuse angle?	no	no								
Are there two acute angles?	yes	yes								
Are there three acute angles?	yes	no								

All these shapes are **triangles.** How many sides does a triangle always have? How many angles does a triangle always have?

What do you think the word "triangle" means?

How many right-angles can a triangle have?

How many obtuse angles can a triangle have?

How many acute angles can a triangle have?

How many acute angles does a triangle always have?

A triangle with one right-angle is called a **right-angled triangle.** A triangle with one obtuse angle is called an **obtuse-angled triangle.** A triangle with three acute angles is called an **acute-angled triangle.**

Which of the triangles are right-angled, which are obtuse-angled and which are acute-angled?

42

Multiplying Money

You know that multiplication is a quick way of adding when all the amounts are the same.

$$\begin{array}{rrr} \pounds & s & d \\ 2 & 17 & 7 \\ 2 & 17 & 7 \\ 2 & 17 & 7 \\ \hline 8 & 12 & 9 \\ \hline \end{array} \qquad \begin{array}{rrr} \pounds & s & d \\ 2 & 17 & 7 \\ \times 3 & & \\ \hline 8 & 12 & 9 \\ \hline \end{array}$$

PRACTICE 72 Do these, first by addition, then by multiplication.

1) £3 12s 4d + £3 12s 4d
2) £2 14s 9½d + £2 14s 9½d + £2 14s 9½d
3) £1 16s 5d + £1 16s 5d + £1 16s 5d + £1 16s 5d + £1 16s 5d
4) £2 8s 7½d + £2 8s 7½d + £2 8s 7½d + £2 8s 7½d
5) £1 15s 4d + £1 15s 4d + £1 15s 4d + £1 15s 4d + £1 15s 4d

PRACTICE 73 Do these as multiplication sums.

1) 16s 9d × 2
2) 12s 6d × 3
3) £2 7s 5d × 4
4) £1 18s 7d × 4
5) £1 15s 8½d × 5
6) £2 16s 9½d × 5
7) £1 17s 3d × 4
8) £1 13s 5½d × 3
9) £2 14s 6d × 5
10) £4 9s 2d × 3
11) £3 16s × 4
12) £3 19s 10d × 5
13) £4 17s 7d × 6
14) £2 2s 4½d × 4
15) £3 14s 11½d × 6
16) £3 16s 7½d × 5
17) £2 13s 7d × 7
18) £9 17s 11d × 3
19) £7 15s 4d × 8
20) £5 12s 9d × 7

PRACTICE 74 Write these questions in numbers, then find the answer. Turn your answer back into words.

1) Father bought 4 chairs costing £2 15s 8d each. How much did he pay?

2) Mr Brown pays rent of £3 16s 9d a week. How much does he pay for 6 weeks?

3) What would be the cost of 8 yards of staircarpet at £1 17s 11d a yard?

4) For her radio, Maureen was paying £1 3s 5d a month for 9 months. How much did she have to pay altogether?

5) Last winter we used 4 tons of coke. The coke cost £12 14s 10d a ton. How much did we pay during the winter?

6) The ironmonger sold 7 oil-heaters at £2 16s 8d each. How much did he get for them?

7) A farmer sold 5 turkeys at £2 11s 4d each. How much did he get altogether?

8) Mother was saving for the holidays. Every month she put £1 15s 6d into the Savings Bank. How much did she save in 9 months?

9) Mother, Father and Auntie went to London by train. The fare was £1 9s 7d each. How much did the journey cost altogether?

10) Father pays the gardener £1 18s 6d a day. Last week he came for three days. How much did Father pay him?

43 Multiplication and Division

You know that multiplication and division are really the same kind of sum. $7 \times 23 = 161$ $161 \div 7 = 23$
$23 \times 7 = 161$ $161 \div 23 = 7$
These are all the same sum, though it is set out in four different ways.

PRACTICE 75 Write each of these in three different ways.

1) $5 \times 7 = 35$
2) $4 \times 6 = 24$
3) $19 \times 4 = 76$
4) $37 \times 5 = 185$
5) $54 \div 3 = 18$
6) $117 \div 9 = 13$
7) $136 \div 8 = 17$
8) $252 \div 7 = 36$
9) $187 \times 4 = 748$
10) $266 \div 38 = 7$

PRACTICE 76 Ask three different questions about each of these. Write an equation for each question, and turn the answer back into words.

1) We had 5 boxes, each with 28 sweets. We had 140 sweets altogether.

2) Supporters for the football match came in three coaches. Each coach held 36 people, so there were 108 supporters.

3) At the party there were 16 tables, each with 8 people, so there were 128 people altogether.

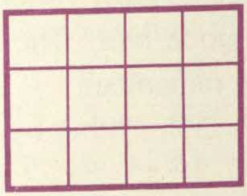
4) The council houses were arranged in 14 blocks, each block having 4 houses. There were 56 houses.

5) The book-case had 5 shelves, each with 17 books, so there were 85 books in the book-case.

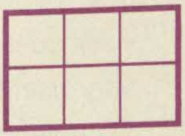
44

Changing Fractions

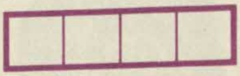
Cut these shapes out of card.



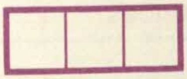
One of these



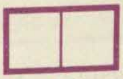
2 of these



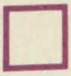
3 of these



4 of these



6 of these



12 of these

How many of the single squares will fit on to the largest piece of card? What fraction of the whole is each square?

How many twelfths are there in each double square? How many of these will fit on to the big card? What fraction of the whole is each double square? Write your results like this.

$$\frac{2}{12}=\frac{1}{6}$$

Do the same with each other piece, and write your results in the same way.

PRACTICE 77 Put the right number instead of the letter in each of these. You may use the cards if you wish.

1) $\frac{1}{3}=\frac{x}{12}$ 2) $\frac{1}{2}=\frac{y}{12}$ 3) $\frac{1}{6}=\frac{z}{12}$

4) $\frac{1}{4}=\frac{a}{12}$ 5) $\frac{1}{12}=\frac{b}{12}$ 6) $\frac{2}{3}=\frac{c}{12}$

7) $\frac{3}{4}=\frac{d}{12}$ 8) $\frac{5}{6}=\frac{h}{12}$ 9) $\frac{4}{6}=\frac{k}{12}$

10) $\frac{3}{6}=\frac{m}{12}$

45

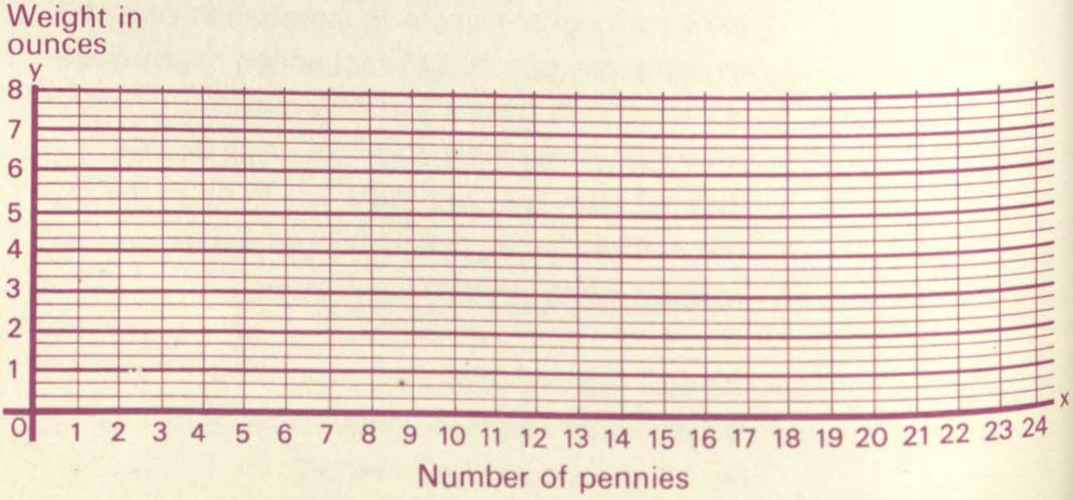
Weighing Pennies

Take 3 pennies and estimate their weight. Write down your guess. Now weigh the pennies. Was your guess a good one? The weight of 3 pennies is very useful to remember.

Complete this table, either by weighing or by thinking.

x - number of pennies	3	12	24
y - weight in ounces	1		

Make a frame like this, and draw a line graph. What would be the weight of no pennies?



From the graph find the weight of

1) 15 pennies 2) 9 pennies 3) 21 pennies
4) 6 pennies 5) 18 pennies

Find from the graph how many pennies would weigh

6) $2\frac{1}{3}$ oz 7) $4\frac{1}{3}$ oz 8) $7\frac{1}{3}$ oz
9) $5\frac{2}{3}$ oz 10) $3\frac{2}{3}$ oz

46 Solving Equations

You know that addition and subtraction are just different ways of writing the same sum, and so are multiplication and division.

PRACTICE 78 Write each of these in three other ways.

1) $15 + 17 = 32$ 2) $93 \times 8 = 744$
3) $72 - 39 = 33$ 4) $265 \div 5 = 53$
5) $86 + 67 = 153$ 6) $526 - 177 = 349$
7) $281 \times 3 = 843$ 8) $851 \div 23 = 37$
9) $43 \times 17 = 731$ 10) $358 + 475 = 833$

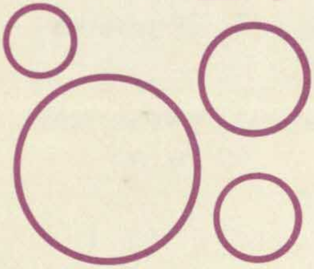
Reversing a sum like this is often useful in solving an equation. If we know that $8 + x = 14$, we can change this to $x = 14 - 8$. Then we can see that $x = 6$.

PRACTICE 79 Solve these equations by changing the sum.

1) $6 + x = 13$ 2) $5 \times y = 35$
3) $11 - z = 6$ 4) $p - 8 = 15$
5) $32 \div q = 8$ 6) $a \div 7 = 3$
7) $b + 11 = 19$ 8) $c \times 6 = 18$
9) $15 \div x = 3$ 10) $37 - y = 14$

47

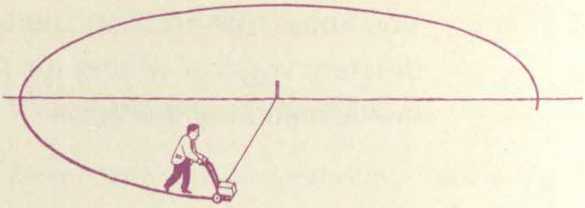
Circles



Look at these shapes.
Are they all the same size? Are they all the same shape? Are they symmetrical? How many straight lines are there? Turn the page round. Do they still look the same? What are these shapes called?

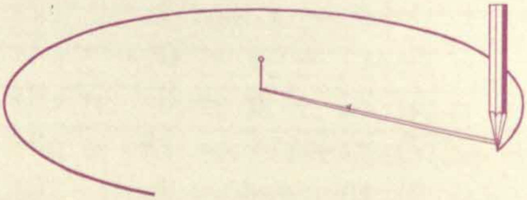
48

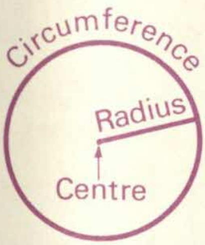
Drawing a Circle



When a groundsman marks out a football pitch, he has to make a circle. He does this with a piece of rope. He fastens one end to the centre spot. He fastens the marker to the other end. The rope is 10 yards long. He moves the marker round, keeping the rope tight all the time. The marker makes a line which is always 10 yards from the centre spot. This line is a **circle.** A circle is a line which is always the same distance from its centre.

Use a pin, a piece of thread and a pencil to draw a circle. Stick the pin into the paper at the place where you want the centre to be. Make a loop in the thread, and put it over the pin and the pencil point. Keep the thread tight and move the pencil round the pin. This will draw a circle.

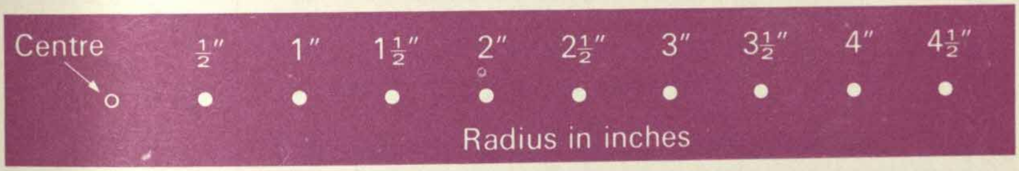




Make the loop smaller, and draw another circle. Is this circle larger or smaller?

The pin is at the **centre** of the circle. The length of the loop of cotton is called the **radius.** The line drawn by the pencil is the **circumference.**

Cut a strip of card, and mark it like this.



If you can, use a punch to make the holes. Put a drawing pin through the centre spot. Fix it in the paper. Put your pencil (with a sharp point) through the hole you want. Then move the pencil round the pin.
Make a pattern, using circles, and colour it.

49

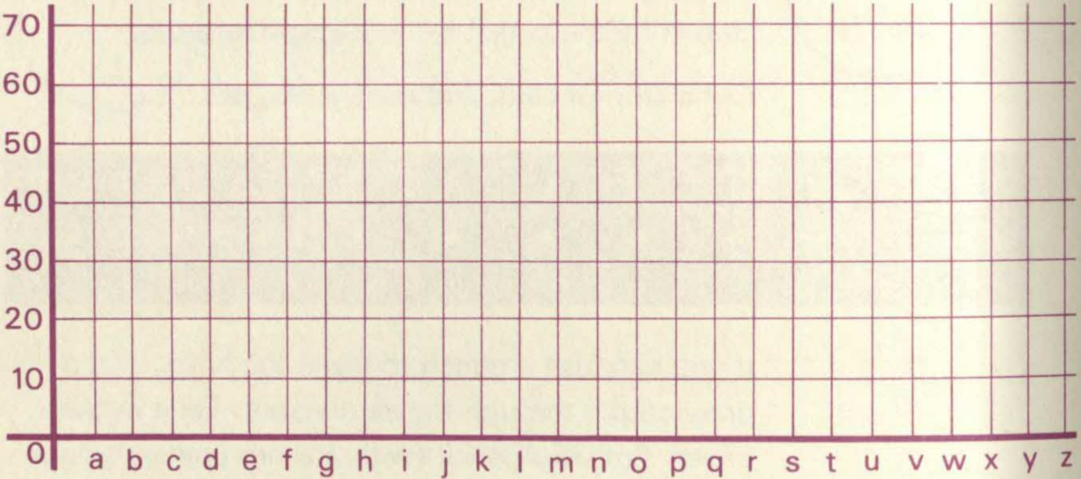
Useful Letters

Write out the alphabet. Which letter do you think is used most? Which letters do you think are used least?
Take any page of a book, and, looking at every letter, find out how often each letter is used. A good way of counting is to put a stroke each time a letter is used, until the fifth stroke, which you put across the other four.

3 times would be written ///
5 times would be written ~~////~~
12 times would be written ~~////~~ ~~////~~ //

This means that if you forget what number you have reached in your counting, you can easily find out what it was.

When you have finished, write the answer for each letter as a round number. Then write your results in a table.
Make a graph of your results, on a frame like this.



Do the same with another page, and draw another graph on the same frame, using a different colour. (If you are working in a group, each of you could take a different page.) What do you notice about your results? Were you right in your estimates? Can you think of any ways in which this knowledge could be useful?

50

Remainders

Put out 17 counters. Divide them into two equal sets. How many counters are there in each set? What else do you have? The counter which is left over is the **remainder.** As it is a counter, you must leave it as it is. We write this $17 \div 2 = 8$ rem. 1. But if we were dividing 17 apples, we need not leave one apple over. We could cut it into 2 halves, and put one half with each group. How many apples would there be in each group then?

What we do with the remainder depends on the kind of thing we are dividing. If they are children, tables, motor cars or other things which must stay as whole things, we just have a remainder. If they are cakes, pieces of string, or anything which can be cut or broken into parts, then we divide the remainder, and add a fraction to each part.

Let us divide 10 cakes among 4 children.

$10 \div 4 = 2$, and 2 over.

We divide the 2 cakes over by 4.

We write this sum $\frac{2}{4}$. We know that $\frac{2}{4}$ is the same as $\frac{1}{2}$.

So $10 \div 4 = 2\frac{1}{2}$.

PRACTICE 80 Write an equation about each of these questions. Then find the answer. There may be a remainder, or you may be able to give the answer as a fraction. Turn the answer back into words. Take care that it makes sense when it is in words.

1) A grocer had 38 eggs to pack into 6 boxes. How many eggs would he put into each box?

2) Mother baked 15 mince pies for her 6 children. How many could they each have?

3) Father had 9 feet of string to tie up 4 parcels. How many feet of string could he use for each parcel?

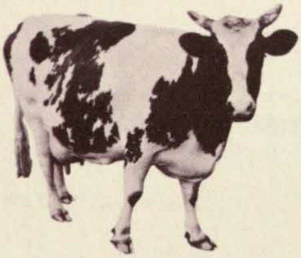
4) Father had 27 currant bushes, which he wanted to plant in 5 rows. How many bushes should he put in each row?

5) There are 37 children in the class, to be put into 4 teams. How many children would be in each team?

6) An army platoon has 26 gallons of petrol for its 4 lorries. How much petrol should be put into each lorry?

7) In the school dining room we have 6 tables and 50 chairs. How many chairs should we put at each table?

8) The grocer had a cheese weighing 58 lbs. He cut it into 4 equal pieces. How much did each piece weigh?



9) Mother took 30 shillings out of the lodger's gas-meter after 4 weeks. How many shillings did the lodger spend on gas each week?

10) A farmer had 76 cows and 3 milking sheds. How many cows should go in each shed?

PRACTICE 81 Write a sensible story about each of these.

1) $15 \div 2 = 7\frac{1}{2}$
2) $12 \div 5 = 2$ rem. 2
3) $23 \div 4 = 5\frac{3}{4}$
4) $29 \div 7 = 4$ rem. 1
5) $19 \div 3 = 6\frac{1}{3}$

51

Adding and Subtracting Fractions

Use the same cards as you did for **Changing Fractions** (page 65). Take the piece representing $\frac{1}{3}$ and the piece representing $\frac{1}{4}$. Put them together, and write in your book $\frac{1}{3} + \frac{1}{4}$.

How many twelfths is $\frac{1}{3}$? How many twelfths is $\frac{1}{4}$? Write the sum again, but this time turn the fractions into twelfths. $\frac{4}{12} + \frac{3}{12}$. How many twelfths are there altogether?

We can write the whole sum $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

PRACTICE 82 Use the cards to do these sums.

1) $\frac{2}{3} + \frac{1}{4} = x$

2) $\frac{1}{2} + \frac{1}{12} = y$

3) $\frac{1}{12} + \frac{5}{6} = z$

4) $\frac{1}{6} + \frac{5}{12} = k$

5) $\frac{3}{4} + \frac{1}{6} = m$

6) $\frac{1}{3} + \frac{1}{12} = n$

7) $\frac{7}{12} + \frac{1}{3} = p$

8) $\frac{1}{4} + \frac{1}{6} = q$

9) $\frac{1}{2} + \frac{5}{12} = r$

10) $\frac{7}{12} + \frac{5}{12} = s$

11) $\frac{3}{4} - \frac{1}{3} = t$

12) $\frac{7}{12} - \frac{1}{2} = u$

13) $\frac{5}{6} - \frac{1}{4} = v$

14) $\frac{1}{2} - \frac{1}{12} = w$

15) $\frac{1}{3} - \frac{1}{4} = x$

16) $\frac{3}{4} - \frac{1}{6} = y$

17) $\frac{2}{3} - \frac{1}{4} = z$

18) $\frac{3}{4} - \frac{2}{3} = a$

19) $1 - \frac{5}{12} = b$

20) $1 - \frac{1}{12} = c$

52

Naming Sets

Here is the set made up by the Jones family.

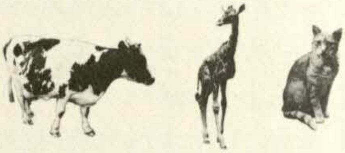
We can name a set by using a capital letter. We can call this set Set J. Or we could call it Set F. We could use any capital letter.

We can also name a set by writing the names of the **members** (or using pictures of the members, or any symbols for them). We put these in special brackets called **braces,** and we put a comma between the members.

Set J = { Mr Jones, Tommy Jones, Mary Jones, Mrs Jones }

Set V = { a, e, i, o, u }

Set A = {



}

PRACTICE 83 Write down five sets that you have seen today. Name each one with a letter, and then name it using braces and commas.

53 Naming the Empty Set

What kind of set is this? What is another name for it?

{ }

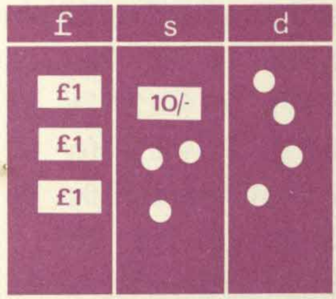
Another way of naming the empty set or null set is to use the symbol $\emptyset$. $\emptyset = \{ \quad \}$

Let us use the name Set W to stand for the set of elephants with wings. Then Set $W = \emptyset = \{ \quad \}$

PRACTICE 84 Describe five empty sets, then name each set in three different ways.

54 Subtracting £ s d

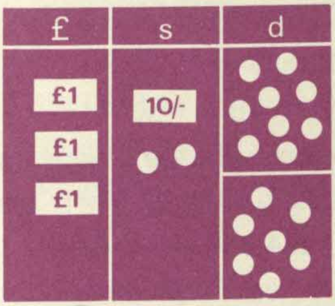
On your abacus, make £5 13s 4d. Let us subtract



£	s	d
3	13	4
1	15	9

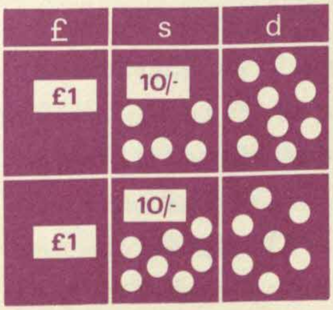
Let us subtract £1 15s 9d.

There are not enough pennies to split into two groups, so we must change one of the shillings into pennies. We can split the pennies into 9 and 7, and we have 12 shillings left.



£	s	d
3	$\cancel{13}^{12}$	$\cancel{4}^{16}$
1	15	9
		7

There are not enough shillings to split as we want, so we must take a pound and change it into 20 shillings, or into a ten-shilling note and ten shillings. We can then split the shillings and the pounds.



£	s	d
$\cancel{3}^{2}$	$\cancel{13}^{12}$	$\cancel{4}^{16}$
1	15	9
1	17	7

PRACTICE 85 Do these, without using your abacus if you can.

1) £3 7s 4d – £1 12s 9d
2) £4 12s 3d – £1 18s 5d
3) £3 15s 1d – £1 17s 4d
4) £4 10s 8d – £2 14s 10d
5) £5 17s 2d – £2 12s 5d
6) £6 13s 7d – £3 16s 9d
7) £7 14s 11d – £2 18s 4d
8) £5 11s – £1 14s 2d
9) £8 1s 4d – £3 17s 8d
10) £7 12s 8d – £3 12s 10d

Sometimes there is no figure in the shillings column. Let us do the sum £5 0s 3d – £2 7s 9d.

$$\begin{array}{rrrr} & \text{£} & \text{s} & \text{d} \\ & 5 & 0 & 3 \\ - & 2 & 7 & 9 \\ \hline \end{array}$$

We cannot split the 3 pennies as we wish, so we must take a shilling. There are no separate shillings, so we take one shilling from the £5. This leaves us with £4 19s. Then we subtract.

$$\begin{array}{rrrr} & \text{£} & \text{s} & \text{d} \\ & \cancel{5}^{4} & \cancel{0}^{19} & \cancel{3}^{15} \\ - & 2 & 7 & 9 \\ \hline & 2 & 12 & 6 \\ \hline \end{array}$$

PRACTICE 86 Do these in whichever way you find easiest.

1) £4 0s 5d – £1 3s 10d
2) £7 0s 6d – £2 17s 8d
3) £6 0s 2d – £3 0s 6d
4) £3 – £1 8s 3d
5) £8 0s 4d – £4 19s 7d

Sometimes, one of the groups must have a halfpenny. If there are no halfpennies already, we must change one of the pennies for two halfpennies.

$$\begin{array}{rrr} \text{£} & \text{s} & \text{d} \\ 5 & 7 & 8 \\ -1 & 4 & 10\frac{1}{2} \\ \hline \end{array} \qquad \begin{array}{rrr} \text{£} & \text{s} & \text{d} \\ 5 & \cancel{7}^{6} & {}^{19}\cancel{8}^{\cancel{7}}\ \frac{2}{2} \\ -1 & 4 & 10\frac{1}{2} \\ \hline 4 & 2 & 9\frac{1}{2} \\ \hline \end{array}$$

If you are not sure of this, do it on your abacus.

PRACTICE 87 Do these, without your abacus if you can, in whichever way you think is easiest.

1) £6 9s 3d − £2 5s 4½d
2) £8 15s 6d − £2 12s 9½d
3) £9 7s 5d − £1 16s 7½d
4) £7 13s 1d − £2 18s 8½d
5) £4 12s 2½d − £1 15s 9½d
6) £5 14s 4½d − £2 17s 11d
7) £7 13s 9d − £2 19s 5½d
8) £9 7s − £3 12s 3½d
9) £8 0s 4d − £4 3s 10½d
10) £6 14s 7d − £3 9s 0½d

PRACTICE 88 Write these questions in numbers, then find the answers. Turn your answer back into words.

1) John was saving for a new camera costing £4 12s 3d. He has £2 15s 6d. How much more must he save?

2) Father had £5 7s 6d. He spent £1 11s 7½d. How much had he left?

3) At the sale, Mother bought a hat for £2 15s 9d. It would have cost £4 7s 3d before the sale. How much did Mother save?

4) We took £8 0s 3d on the first night of the concert, and £6 18s 8d on the second night. On which night did we take more? How much more did we take?

5) Mother and Father bought a new radio set between them. It cost £15 12s 11d. Father put £8 17s 6d towards it. How much must Mother pay?

6) In one shop, a tea service was priced £6 10s. In the market, Mrs Smith bought one exactly the same for £5 19s 11d. How much did she save?

7) Mrs Jones had in her purse 7 pound notes, a ten-shilling note and four pennies. She returned home with 4 pound notes, and 5 half-crowns. How much had she spent?

8) Uncle gave the shop assistant a five pound note to pay for a pair of shoes which cost £3 16s 8d. How much change should he have?

9) Robin was saving to buy a microscope costing £3 11s 6d. He found he had £4 2s 6d. How much extra did he have?

10) In the morning, the ticket collector took £9 14s 10d. At the end of the day he had taken £17 5s 3d. How much did he take in the afternoon?

55 My Book of Shapes

Make a book, called "My Book of Shapes". In it, draw all the things you can find which are rectangles, squares, triangles or circles. Say if there is anything special about each shape.

56 Dates

How many birthdays have you had? You can ask your friends this question. They will probably tell you they have had a lot. But this is not the right answer. They have had only one birthday. Your birthday is the day on which you were born. Every year after that, you have a birthday anniversary, when you remember that day.

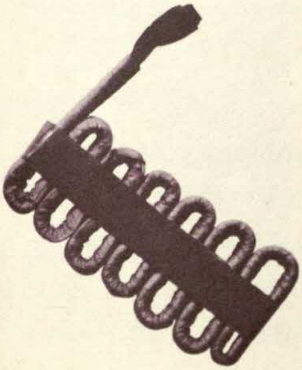
What was the **date** of your birthday? You must know the number of the day, the name of the month, and the year.

We can write dates in several ways. Queen Elizabeth II was born on 21st April 1926. Sometimes (usually on a letter or a form) we would write this 21.4.26, or 21/4/26. What does the 4 stand for? Why? If there might be a mistake about the year, we write it in full: 21.4.1926.

PRACTICE 89 Write the names of 15 children in your class, and by the names write their birthdays, in two ways. Try to get at least one for each month of the year.

PRACTICE 90 Use a diary or calendar to find these dates this year, and write each one in two different ways.

1) New Year's Day
2) Shrove Tuesday
3) Good Friday
4) Easter Monday
5) All Fools' Day
6) May Day
7) Whit Monday
8) August Bank Holiday
9) Guy Fawkes' Day
10) Christmas Day



57 Counting On in Nines

T	U
0	9
1	8
2	7
3	6
4	5
5	4
6	3
7	2
8	1
9	0

Starting with 9, count on in 9's till you reach 90. Make each number in turn on your abacus. Write the numbers in a column. Look at the tens. What do you notice? Look at the units. What do you notice? Can you explain why each number should have one more ten and one less unit? Look at the first and last numbers. Now look at the second number and the next-to-last number. What do you notice? Pair off the other numbers in the same way Add the number of tens and the number of units in each number. What do you notice?

PRACTICE 91 Put the right numbers in place of the letters in these series.

1) 9, 18, 27, x, 45, y, 63, 72
2) 90, p, 72, 63, q, 45, 36
3) 36, 45, 54, a, b, 81, 90
4) x, y, 63, 54, 45
5) 36, p, q, 9

PRACTICE 92 Write each of these in as many other ways as you can.

1) £2 16s 4½d + £5 7s 9d = £8 3s 1½d
2) £3 15s 6½d × 4 = £15 2s 2d
3) £5 12s 4½d ÷ 3 = £1 17s 5½d
4) £9 2s 7d − £2 5s 10d = £6 16s 9d
5) £3 7s 8d + £1 19s 10d = £5 7s 6d

PRACTICE 93 Ask three questions about each of these. Write an equation, then turn the answer into words.

1) Jean bought a doll for £1 3s 6d and a teddy bear for £1 8s 9d. For them both she paid £2 12s 3d.

2) Timothy bought 5 model cars. They cost 3s 6d each, so he paid 17s 6d altogether.

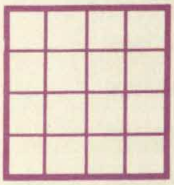
3) Mother went out shopping with £4 10s 6d. She spent £2 8s, and came back with £2 2s 6d.

4) Mr Johnson was going to buy a record player for £17 6s 3d. Instead, he bought a cheaper model for £13 15s 11d, so he saved £3 10s 4d.

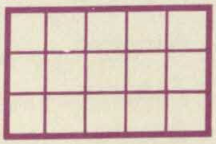
5) Mother bought 6 pillow-cases for £3 13s 6d, so she knew they cost 12s 3d each.

58 Area

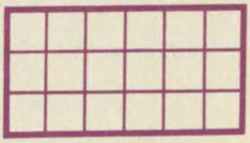
A



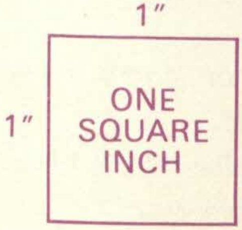
B



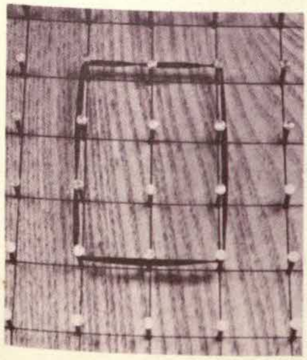
C



Which of these rectangles is the biggest? Which is the smallest? How do you know? The space inside a shape is called its **area.** The area of A is 16 squares. The area of B is 15 squares. The area of C is 18 squares.



When we measure the area of a shape, we must say how big each square is. For small shapes, we can use a square with a side of one inch. The space inside it is called "1 square inch".



Look at the **shapes board.** The nails on it make 1 inch squares. With a rubber band, make this rectangle on the shapes board.

How many square inches are inside the rubber band? This is the area of the rectangle.

Make a table like this.

LENGTH	BREADTH	AREA
3 inches	2 inches	6 square inches

Make six more rectangles, all different. Put them in the table. Look at the length, breadth and area of each rectangle. What connection can you see? What is a quick way of finding the area of a rectangle? Can you explain why?

Try to complete this table without making the rectangles on the shapes board.

LENGTH	BREADTH	AREA
5 inches	4 inches	x square inches
7 inches	3 inches	y square inches
8 inches	5 inches	z square inches
9 inches	4 inches	a square inches
5 inches	5 inches	b square inches
8 inches	6 inches	c square inches

59

Mixed Bag

PRACTICE 94

Write each of these as an equation, and solve it. Turn the answer back into words.

1) Each milk crate holds 30 bottles. If we have 6 full crates, how many bottles have we?

2) A double-decker bus can carry 26 passengers downstairs and 28 upstairs. How many passengers can it take?

3) Pamela has a book with 52 puzzles in it. She has done 38 of them. How many more has she to do?

4) A sheet of stamps has 8 rows, with 12 stamps in each row. How many stamps are there in the sheet?

5) How many hair-ribbons, each 2 feet long, could be made from a piece of ribbon 36 feet long?

6) Three buses arrived at the bus station. The first carried 53 passengers, the second 50 and the third 48. How many passengers arrived altogether?

7) The grocer had 56 tablets of soap left out of 120. How many had he sold?

8) Teacher's car can carry 6 children. How many trips must he make to carry 16 children?

9) In Class 1 there were 38 children, in Class 2 there were 36, in Class 3 there were 39 and in Class 4, 37. How many children were there in the 4 classes?

10) There were 4 boxes of pencils, each holding a gross (144). How many pencils were there?

11) There were 214 children for medical inspection. The doctor had seen 178. How many more had he to see?

12) We had 50 feet of rope to make 8 skipping ropes. How long could each rope be?

13) We travelled 97 miles in the morning, 76 miles in the afternoon and 28 miles in the evening. How far did we travel that day?

14) A packet would hold 5 biscuits. How many packets could we fill from a box of 144 biscuits?

15) For our concert, we sold 354 two-shilling tickets and 167 half-crown tickets. How many tickets did we sell?

16) A newsboy delivers 47 papers each day except Sunday. How many papers does he deliver in one week?

17) There were 285 children present at school. If there were 315 children on the roll, how many were absent?

18) The carpenter took 26 hours to make 8 chairs. How long did he spend on each chair?

19) Our school scored 152 runs in a cricket match, while our opponents scored 147. Who won? By how many runs did they win?

20) There were 150 toffees in the tin, and 7 children at the party. How many toffees could each child have?

60

Denominators

When we added $\frac{1}{4}$ and $\frac{1}{6}$, we changed them both to twelfths. We changed the number at the bottom, which we call the **denominator.** "Denominator" means "name"

$$\frac{1}{4}+\frac{1}{6}=\frac{3}{12}+\frac{2}{12}=\frac{5}{12}$$

We can add or subtract any fractions, if we change them to the same denominator. Let us solve the equation $\frac{1}{2}+\frac{1}{3}=x$. We can change them both to sixths or to twelfths. It is better to choose the smaller denominator.

How many sixths is one half? How many sixths is one third?

$$\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$$

Let us solve the equation $\frac{3}{4}-\frac{5}{8}=y$. What denominator shall we change to?

$$\frac{3}{4}-\frac{5}{8}=\frac{6}{8}-\frac{5}{8}=\frac{1}{8}$$

PRACTICE 95 Solve these equations, without using strips or cards.

1) $\frac{3}{4}+\frac{1}{8}=a$
2) $\frac{1}{2}+\frac{1}{4}=b$
3) $\frac{1}{4}+\frac{3}{8}=c$
4) $\frac{1}{3}+\frac{1}{4}=d$
5) $\frac{1}{2}+\frac{3}{8}=x$
6) $\frac{2}{3}+\frac{1}{6}=y$
7) $\frac{3}{4}+\frac{1}{6}=z$
8) $\frac{5}{8}+\frac{1}{4}=k$
9) $\frac{1}{4}+\frac{2}{3}=m$
10) $\frac{1}{8}+\frac{1}{2}=n$
11) $\frac{3}{4}-\frac{5}{8}=p$
12) $\frac{1}{4}-\frac{1}{6}=q$
13) $\frac{3}{4}-\frac{1}{3}=r$
14) $\frac{1}{2}-\frac{1}{3}=s$
15) $\frac{2}{3}-\frac{1}{4}=t$
16) $\frac{3}{4}-\frac{2}{3}=u$
17) $\frac{5}{6}-\frac{1}{4}=v$
18) $\frac{1}{3}-\frac{1}{4}=w$
19) $\frac{3}{4}-\frac{1}{6}=x$
20) $1-\frac{3}{8}=y$

Sometimes, we make the denominator of a fraction bigger, so that we can add or subtract. But fractions are easier to understand if the denominator is as small as it can be. We should never leave a fraction with a bigger denominator if we could give it a smaller one.

PRACTICE 96 Write these fractions with the smallest denominator they could have.

1) $\frac{3}{6}$
2) $\frac{4}{12}$
3) $\frac{2}{8}$
4) $\frac{2}{12}$
5) $\frac{4}{8}$
6) $\frac{8}{12}$
7) $\frac{6}{8}$
8) $\frac{10}{12}$
9) $\frac{4}{6}$
10) $\frac{9}{12}$

PRACTICE 97 Solve these equations, giving your answer with the smallest denominator it can have.

1) $\frac{7}{12} + \frac{1}{12} = a$

2) $\frac{1}{3} + \frac{1}{6} = b$

3) $\frac{1}{4} + \frac{1}{12} = c$

4) $\frac{1}{6} + \frac{1}{12} = d$

5) $\frac{7}{12} + \frac{1}{4} = f$

6) $\frac{1}{2} + \frac{1}{6} = g$

7) $\frac{7}{12} + \frac{1}{6} = h$

8) $\frac{1}{4} + \frac{5}{12} = k$

9) $\frac{1}{3} + \frac{5}{12} = m$

10) $\frac{3}{4} + \frac{1}{12} = n$

11) $\frac{1}{3} - \frac{1}{12} = p$

12) $\frac{7}{12} - \frac{1}{4} = q$

13) $\frac{3}{4} - \frac{7}{12} = r$

14) $\frac{11}{12} - \frac{1}{4} = s$

15) $\frac{5}{6} - \frac{7}{12} = t$

16) $\frac{3}{4} - \frac{5}{12} = u$

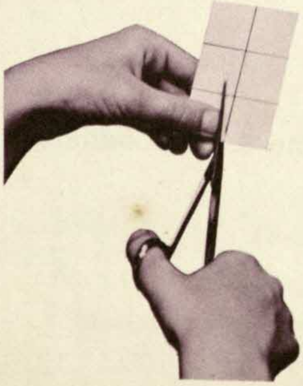
17) $\frac{2}{3} - \frac{1}{12} = v$

18) $\frac{11}{12} - \frac{3}{4} = w$

19) $\frac{7}{12} - \frac{1}{3} = x$

20) $\frac{5}{6} - \frac{1}{2} = y$

61 More Areas



On a piece of card or paper, draw a rectangle 3 inches long and 2 inches wide. Cut it into strips one inch wide. How many strips are there? Why? How many square inches are there in each strip? How many square inches are there altogether? Write this down like this: 2 × 3 sq in = 6 sq in. Do the same with a rectangle 4 inches long and 3 inches wide. Then do it with a square with a side of 3 inches.

A short way of writing the measurements of these rectangles is 2″ × 3″, 4″ × 3″, 3″ × 3″.
Make these rectangles on the shapes board, or draw them in your book, and find the areas without counting the squares.

1) 5″ × 3″ 2) 6″ × 4″ 3) 4″ × 2″
4) 5″ × 4″ 5) 6″ × 3″

Now make some more rectangles, and write down their measurements and their areas.

62 Sums in Two Parts

Sometimes, to find out what we want to know, we must do more than one sum, like this.
There were 73 story-books and 126 others on the library shelves. If there were 320 books in the library, how many had been borrowed?
We write the first part as an equation, solve it, and turn the answer back into words.

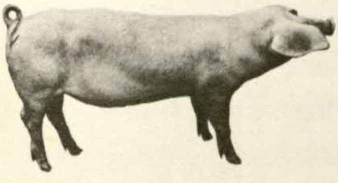
$$73 + 126 = x$$
$$199 = x$$

There were 199 books on the shelves.
Now we do the second part, using the first answer.

$$320 - 199 = y$$
$$121 = y$$

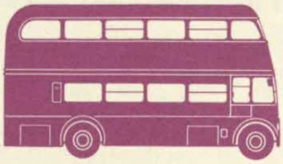
121 books had been borrowed.

PRACTICE 98 Answer these questions, in two parts.



1) A farmer had 7 sties, each with 5 pigs, and one sty with 8 pigs. How many pigs had he?
2) I have 8 sheets of stamps. Each sheet has 6 rows of 12 stamps. How many stamps are there?
3) We had 6 packets, each with 24 exercise books. We used 56 books. How many were left?

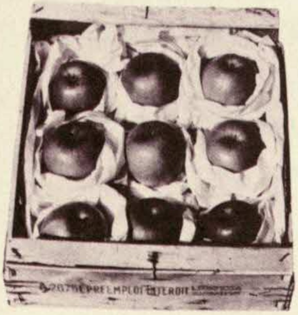
4) A double-decker bus could carry 27 people downstairs and 30 upstairs. How many people could 5 buses carry?



5) Mother shared 65 chocolates among the 5 children. Tom ate 4 of his. How many did he have left?

6) The shopkeeper put 98 postcards into 7 equal packets. He sold 4 packets, and had 3 left. How many cards had he left?

7) We are at school for 3 hours in the morning and 2 hours in the afternoon. For how many hours are we at school each week?



8) The greengrocer had 215 apples. He put them into boxes of 9, and the ones he had left over he gave to his 4 children. How many apples did each child have?

9) Father had to make a journey of 183 miles. He went 96 miles in the morning and 67 miles in the afternoon. How far had he to go in the evening?

10) The window cleaner charges a shilling for each window he cleans. In one street, there are 9 houses, each with 6 windows downstairs and 8 upstairs. How many shillings was he paid in that street?

11) There were 3 packets of 36 sheets of paper for 8 children. How many pieces of paper could each child have?

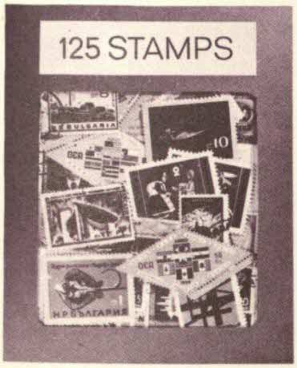
12) On an outing with 4 coaches, one coach carried 32 children, another 27 and another 35. There were 124 children altogether. How many children were on the fourth coach?

13) The grocer had a box of 180 eggs. 9 were

broken, and he put the rest into boxes of 6. How many boxes did he need?

14) There were 43 passengers on the bus. 27 people got off, and 34 got on. How many were on the bus then?

15) At Christmas, we had one box of 48 sweets, another with 30 and another with 36. There were 6 of us to share them equally. How many should we each have?



16) Tom, Dick and Harry each bought a packet of 125 stamps. They each gave 30 to Mary. How many stamps did the 3 boys have altogether then?

17) Peter had 83 conkers. He kept 30 for himself and shared the rest equally among his 4 friends. How many did each friend have? How many did Peter have?

18) Father shared 87 marbles among the 3 children. Bob already had 34 marbles. How many did he have then?

19) We heard on the news that the factory used 427 tons of steel last week, which was 156 tons more than the week before. How much steel did the factory use in these two weeks?

20) 7 boxes of books, all the same size, weighed 161 lbs. How much would 5 of these boxes weigh?

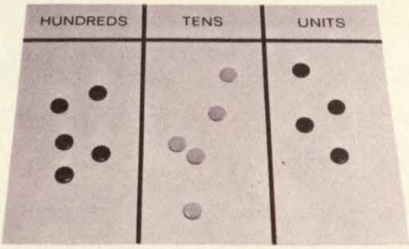
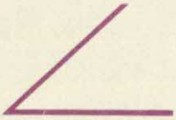
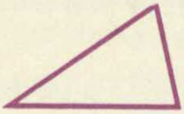
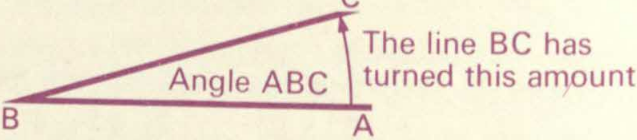
PRACTICE 99 What are the areas of these rectangles?

1) 6″ × 5″ 2) 7″ × 4″ 3) 8″ × 3″
4) 7″ × 5″ 5) 8″ × 6″ 6) 9″ × 4″
7) 8″ × 5″ 8) 7″ × 3″ 9) 9″ × 6″
10) 8″ × 4″

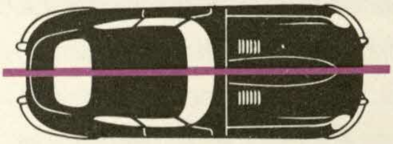
PRACTICE 100 What are the areas of these squares?

1) side 4″ 2) side 6″ 3) side 7″
4) side 5″ 5) side 8″

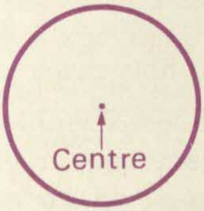
Reference Pages

abacus	A frame for counting. Some use counters, some use beads. It can be used for ordinary numbers, money, weights, measures, etc. *Page 5* 
acute angle	An angle that is less than a right-angle. *Pages 19, 62* 
acute-angled triangle	A triangle with three acute angles. Every triangle has at least two acute angles. *Page 62* 
addition	Putting several sets of things together and finding out how many there are altogether. *Page 14*
angle	The amount a line has turned about a point. An angle is usually named by three letters. *Pages 19, 41* 
area	The amount of space inside a shape. It is usually measured in square measure, such as square inches or square feet. To find the area of a rectangle, multiply the length by the breadth (but make sure they are both in the same units). To find the area of a square, multiply the length of the side by itself. *Pages 81, 86*

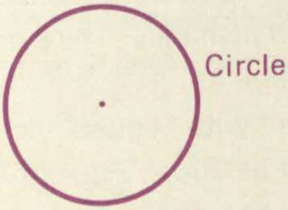
axis of symmetry	The line (sometimes real, sometimes imaginary) about which a symmetrical shape balances. *Page 54*



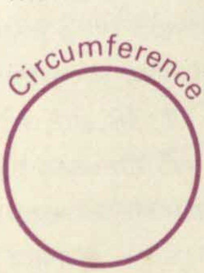
braces	{ } These are special brackets which are put round the names of all the members of a set. When braces are used, the order of the members does not matter. *Page 74*
breadth	The short side of a rectangle; the side which is not the length. *Page 54*
centre	The point inside a circle which is the same distance from any part of the circumference. *Page 69*



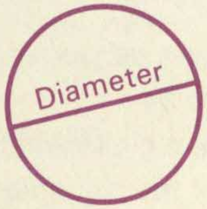
circle	A line which is always the same distance from a point. *Pages 47, 68, 69*



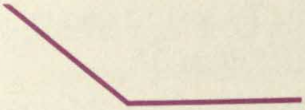
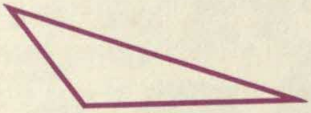
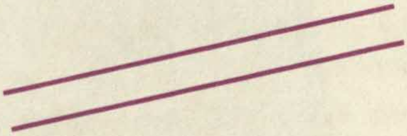
circumference	The distance all round a circle; the actual line which makes the circle. *Page 47*

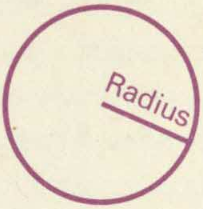
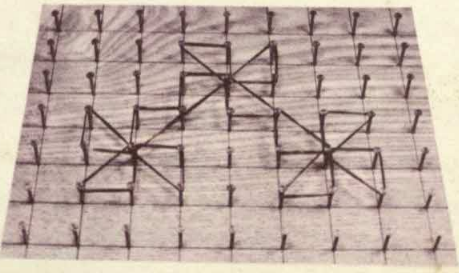


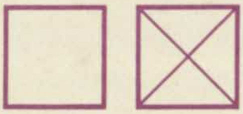
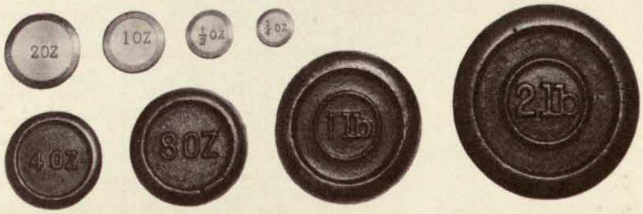
date	When written in full, a date gives the number of the day, the number or name of the month, and the year. 21st July 1965 or 21.7.65 or 21/7/65. *Page 79*
denominator	The number under the bar of a vulgar fraction, which gives its name to the fraction. In the fractions $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, the denominator is 8 and the fractions are eighths. *Page 84*
diameter	The distance across a circle through the centre. *Page 47*



division	Splitting a number into several equal parts. We may have to find how many parts, OR how many in each part. We could do this by subtracting the same number many times; division is a quick way of doing this. *Pages 32, 59, 64*
empty set	A set which has no members. It is also called the **null** set. There is only one empty set, because any set with no members is identical with every other set with no members. The symbol for the empty set is $\emptyset$. *Page 49*
equation	A statement with "equals" or = in the middle; both sides must be equal. *Pages 17, 67*
fraction	Part of a whole thing. The most usual kinds are vulgar fractions and decimal fractions. *Pages 9, 23*
graph	A line, usually drawn on a frame, which tells something about how a certain measurement changes. *Pages 14, 38, 40, 43, 66, 70*
histogram	A kind of graph which uses blocks of colour or shading to show how a measurement changes. *Pages 14, 38*

length	The long side of a rectangle; the side which is not the breadth. *Page 54*
line	A distance between two points. It is usually named by calling each point by a capital letter. *Page 12*
line graph	A graph made by joining a series of points with a line. The graph then shows how a certain measurement changes. *Pages 40, 43*
magic square	A set of numbers arranged in a square so that the sum of the numbers in any line is always the same. *Page 4*
member	One of the things which make up a set. *Page 74*
null set	A set which has no members. It is also called the **empty** set. There is only one null set, because any set with no members is identical with every other set with no members. The symbol for the null set is ϕ. *Page 49*
obtuse angle	An angle that is more than a right-angle. *Pages 19, 62* 
obtuse-angled triangle	A triangle with one obtuse angle and two acute angles. A triangle can never have more than one obtuse angle, nor an obtuse angle and a right angle. *Page 62* 
parallel	Lines which are always the same distance apart are parallel. *Page 53* 
quadrilateral	Any shape with four straight sides. "Quadri-lateral" means "four-sided". *Page 55*

radius	The distance from the centre of a circle to any point on the circumference. In any one circle, this distance is always the same. *Page 69* 
rectangle	A quadrilateral with opposite sides parallel and its angles right-angles. "Rectangle" means "right-angle". A rectangle also has its opposite sides equal; its diagonals are equal, and bisect each other (cut each other into equal parts). *Pages 54, 55*
remainder	What is left after a number has been divided into equal parts. *Page 70*
reversal	A different way of writing the same equation, by reversing the order of the numbers. $3 + 2 = 5$ is a reversal of $5 - 3 = 2$. $9 - 5 = 4$ is a reversal of $9 - 4 = 5$. $7 + x = 12$ can be reversed to give $x = 12 - 7$. *Page 31*
right-angled triangle	A triangle with one right-angle. No triangle can have more than one right-angle. *Page 62*
round number	A number which is an exact number of tens or hundreds or thousands. *Page 44*
set	Any collection of any things. *Pages 47, 73*
shapes board	A board marked in squares (or some other pattern) with a nail at each point. Rubber bands can be fitted over the nails to make different shapes. *Page 81* 

square	A rectangle with all its sides equal. Its diagonals cut at right-angles. *Pages 54, 55* 
subtraction	Splitting a number into two parts, when you know one of the parts. *Pages 20, 26, 42*
symbol	Something which stands for something else. For instance, H stands for a fire hydrant; £ stands for "pounds". *Page 46*
time	Very long periods of time can be measured in thousands of years; very short periods can be measured to small fractions of a second. *Pages 29, 32*
time-table	A chart showing the times at which certain things will happen. A 'bus time-table shows the times the 'buses arrive at the different 'bus stops. *Page 58*
triangle	A shape with three straight sides and three angles. "Tri-angle" means "three angles". *Pages 61, 62*
vulgar fraction	A fraction written like a division sum. $\frac{2}{3}$ means two whole things divided into three equal parts, OR two of the parts when one whole thing is divided into three equal parts. *Pages 9, 65, 84*
weights	A set of weights is arranged so that each weight after the first is double the one before it. This means that any weight, up to the sum of all the weights, can be weighed. *Page 59* 
zero	0 A symbol used to show that a place on the abacus is empty. It keeps the tens figure in its place when there are no units, and the hundreds figure in its place when there are no tens. Zero is also called *nought*, *nil* or *nothing*. *Page 7*

Addition Table

	9	8	7	6	5	4	3	2	1
1	10	9	8	7	6	5	4	3	2
2	11	10	9	8	7	6	5	4	
3	12	11	10	9	8	7	6		
4	13	12	11	10	9	8			
5	14	13	12	11	10				
6	15	14	13	12					
7	16	15	14						
8	17	16							
9	18								

Multiplication Table

1	10	9	8	7	6	5	4	3	2
2	20	18	16	14	12	10	8	6	4
3	30	27	24	21	18	15	12	9	
4	40	36	32	28	24	20	16		
5	50	45	40	35	30	25			
6	60	54	48	42	36				
7	70	63	56	49					
8	80	72	64						
9	90	81							
10	100								

Longmans' Junior Mathematics
Stages 1, 2, 3, 4, 5 and
accompanying teacher's books

N V Brindley